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Multimedia Move

MAGAZINE

The Suite Face-Off

Word **vs** WordPerfect **vs** Ami Pro

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Excel **vs** Quattro Pro **vs** 1-2-3

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Access **vs** Paradox **vs** Approach

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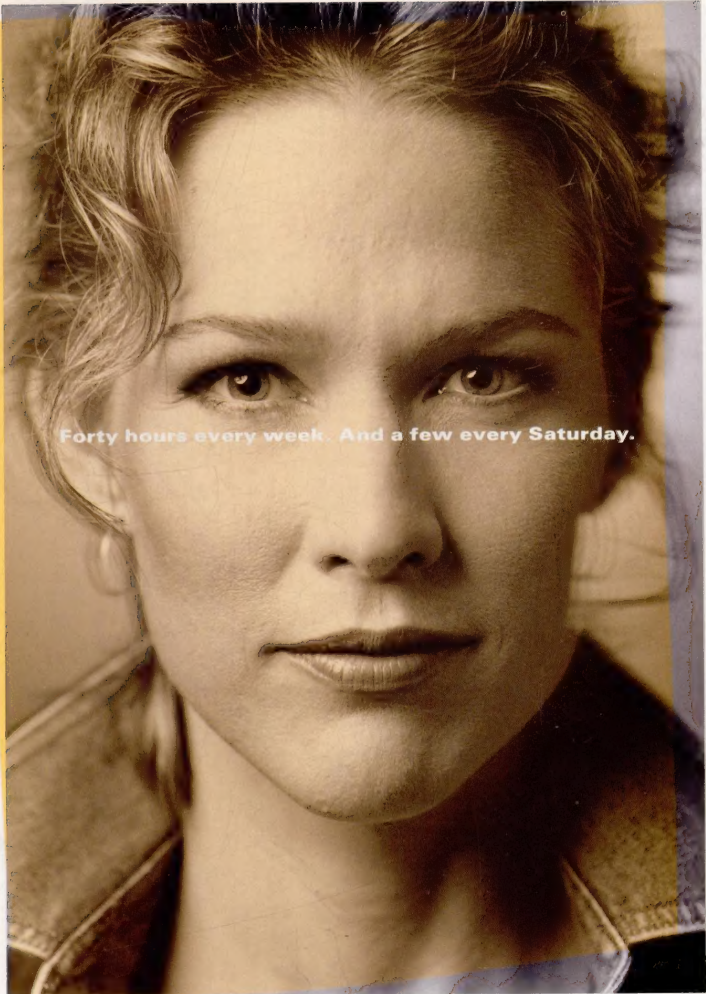
PowerPoint **vs** Quattro Pro **vs** Freelance Graphics

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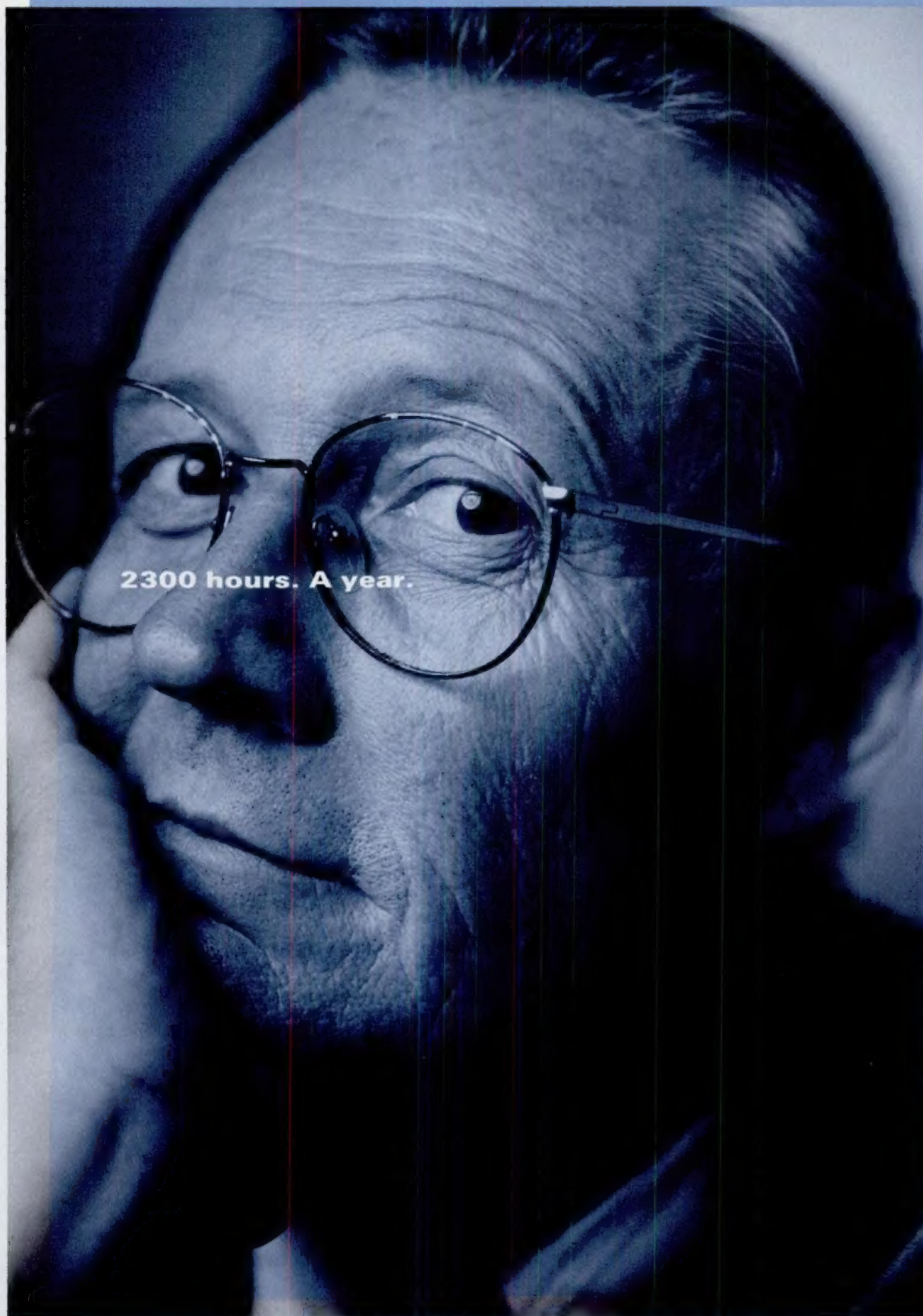


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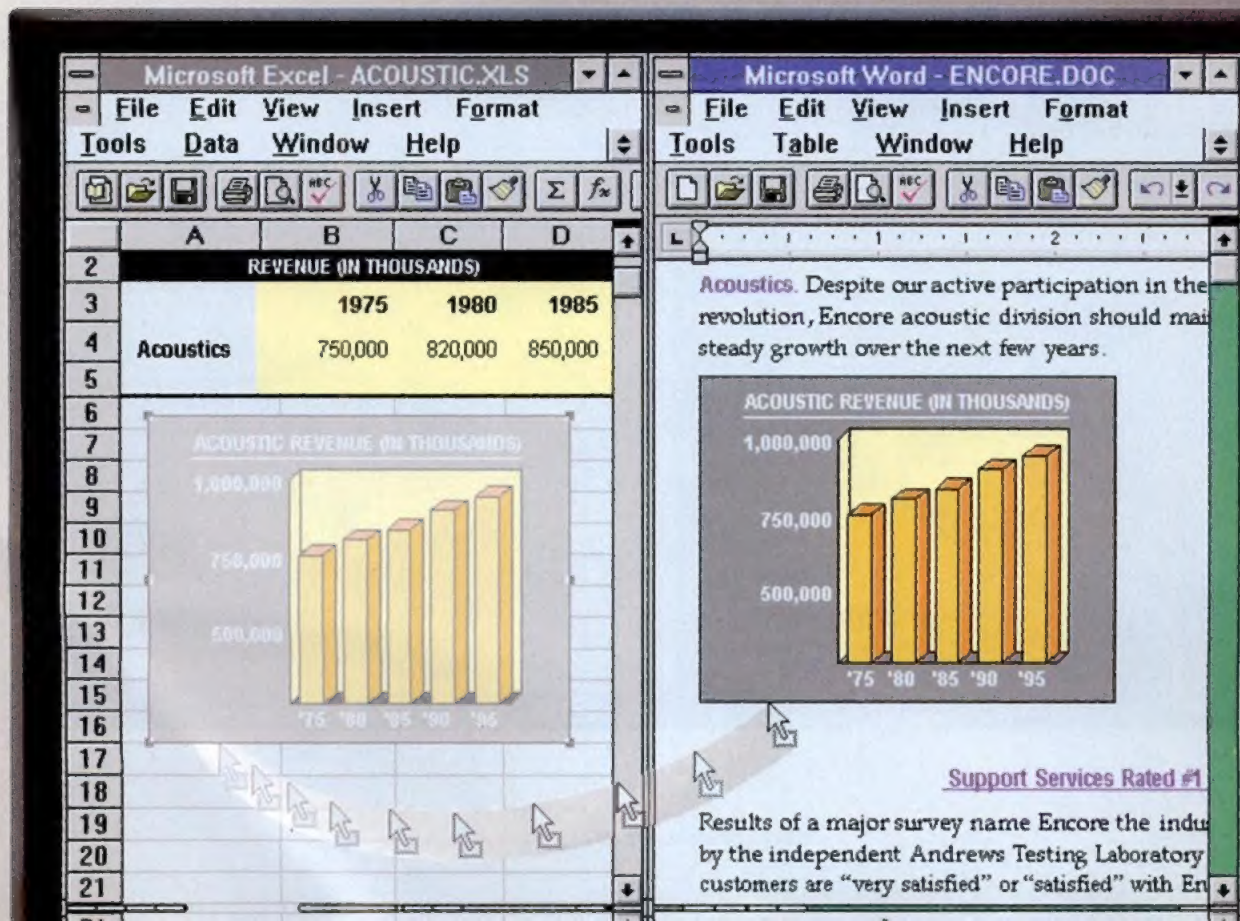


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Inside

One of the great things about the PC industry is how it changes. PCs, software, and peripherals all evolve. And so do we at *PC Magazine*. Every issue brings new challenges to our editorial and lab staffs.

We're now in the midst of a "human"

evolution, with a number of staffers taking on new responsibilities. Most notably, Robin Raskin, a longtime stalwart of the magazine, has been promoted to editor. In her new role, Raskin will be responsible for the day-to-

all of our software coverage as executive editor for software and started writing Pipeline.

"*PC Magazine* is in my blood," Raskin says. "I love editing the magazine as much as I love the products."



Robin Raskin: evolving with *PC Magazine*.

In addition to her work on the magazine, Raskin has a particular interest in educational software. Her book *Parents, Kids & Computers* is the standard in this area. And she has made frequent media appearances showing off the latest in computer technology.

Raskin is just one of our staffers who have taken on new responsibilities. Rick Ayre, formerly PC Labs' technical director for software, is filling Raskin's role as executive editor for soft-

ware. Ben Gottesman, who was project leader for our software team, is moving into the technical director slot. Many others have moved up to new duties.

Raskin's name is familiar to most of you, from her Pipeline column and other articles she has written for the magazine for the past decade. Ten years ago, she began with the magazine as a free-lance writer and frequent contributor. Almost four years ago she came on staff as our senior editor responsible for the First Looks section. Two years ago, she took on responsibility for

day editorial operations of the magazine.

As editor-in-chief, I look forward to continuing to work with Raskin and the rest of the team, including executive editor Bill Howard and PC Labs director Jim Galley. We hope you enjoy reading the magazine as much as we enjoy creating it.

—Michael J. Miller

PC Magazine: The Independent Guide to Personal Computing, ISSN 0888-8507, is published biweekly except in July and August for \$44.97 for one year. Ziff-Davis Publishing Company, L.P., One Park Ave., New York, NY 10016-5802. Second-class postage paid at New York, NY 10016-5802 and at additional mailing offices. POSTMASTER: Address changes to PC Magazine, P.O. Box 54093, Boulder, CO 80321-4093. GST Registration Number: R-123669673. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 266477.

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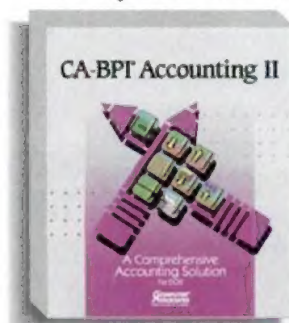
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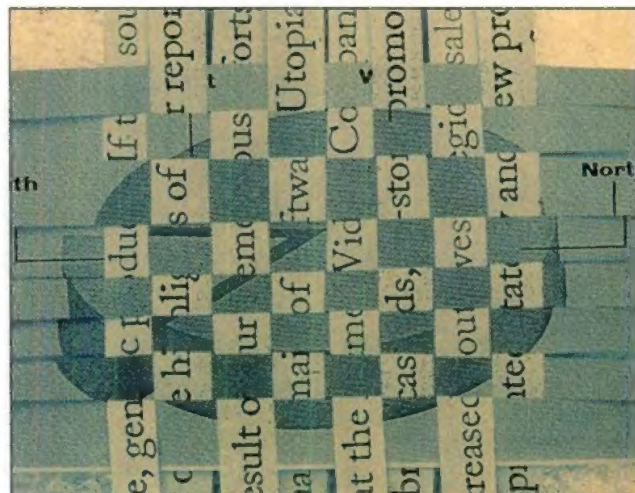
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COVER STORIES

Applications Integration

For years, software vendors have promised us integrated applications that would work together seamlessly. At long last, new technologies and revamped products are turning these promises into reality. In this three-part survey, PC Magazine looks at the current state of the art in applications integration and what it really means for end users and developers.



Getting It Together

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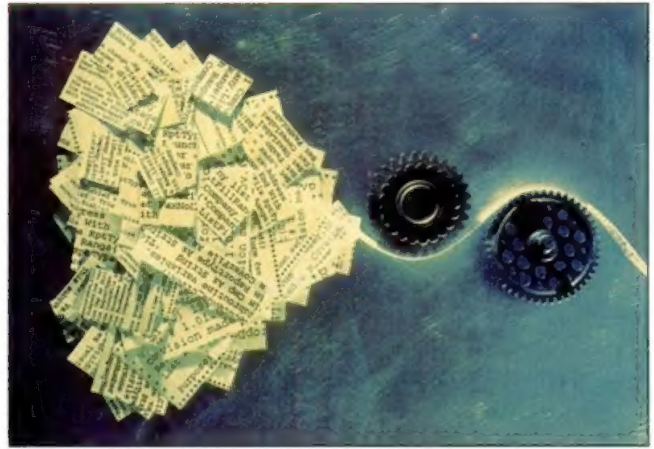
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Color Desktop Scanners

In Living Color

BY DANIEL GROTTA A few years ago, the few 24-bit color flatbed scanners on the market were expensive, limited in capability, and difficult to operate. Today, color scanners are better, more affordable, and easier to use. Many offer single-pass scanning, SCSI interfaces, and Twain drivers. The 21 color desktop scanners we review can all handle 24-bit color and at least 300- by 600-dpi resolution.....245



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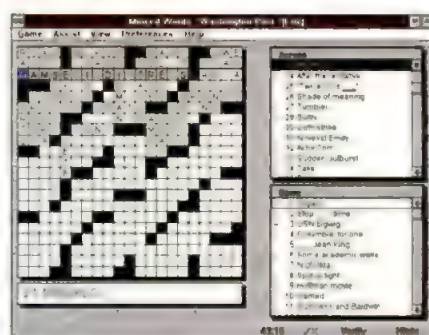
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You're never too young to learn good computing habits (page 426).

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Back Issues: For back issues (subject to availability), \$8 per issue (\$9 outside the U.S.), send check or money order to Back Issues Dept., Ziff-Davis Publishing Company, P.O. Box 53131, Boulder, CO 80322-3131.

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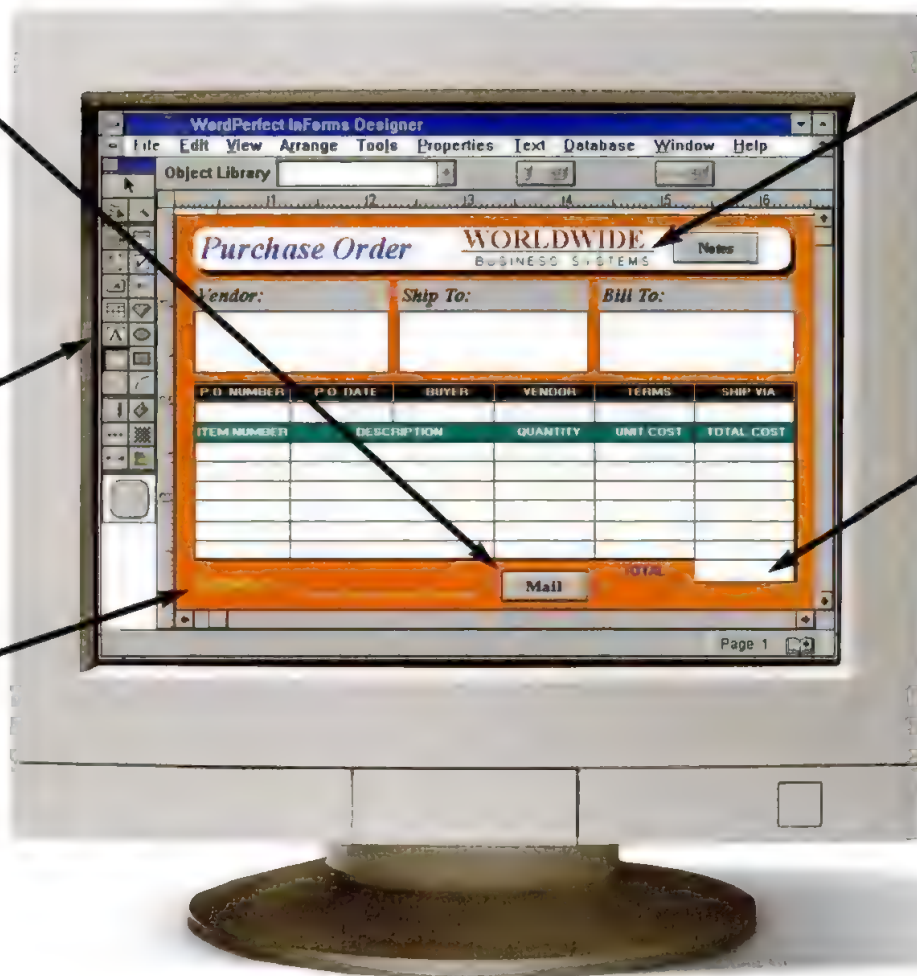
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Letters

PRINTER PRAISE AND PROBLEMS

I found your "10th Annual Printer Issue" (November 23, 1993) to be the most thorough and comprehensive treatment of the printer quagmire I've read yet. The magnitude of information was at times overwhelming but nevertheless extremely useful and informative.

*Tim Lee
Baton Rouge, Louisiana*

Thanks to your annual printer issue, I now have the information to decide on the best printer for my needs and my budget. Congratulations on a job well done.

*Ramses Moya Saud
via PC MagNet*

In response to your glowing recommendation, I bought an HP LaserJet 4L for home use. Imagine my surprise when every incandescent lamp operating on the same circuit as the printer began flickering as the machine was printing the files. Although I remain pleased with the printing quality of the 4L, and an HP technician informed me that no harm will come to my computer or other electrical equipment on the same circuit as the printer, I am less than thrilled with the accompanying light show I have to tolerate.

*Barry Hindin
Reynoldsburg, Ohio*

• According to Hewlett-Packard, this pulsing or flickering phenomenon is characteristic of the technology behind the 4L's instant-on fuser feature. In order for the printer to maintain a consistent printing temperature without requiring a warm-up period, the ceramic heating element of the 4L and 4ML must be turned on and off at a faster rate than fusing assemblies that use a halogen heating element.

The current requirements of this feature leave less current available to other devices on the same electrical circuit, and the most visible result is flickering lights. To diminish the effect, HP suggests using fluorescent lightbulbs, which are less susceptible to the pulsing condition than are incandescent bulbs. — Ed.



*The most comprehensive
treatment of the printer
quagmire I've read yet.*

DO COMPUTERS GROW ON TREES?

I strongly disagree with John C. Dvorak's Inside Track statement (November 23, 1993): "The serious home computer user, though, can afford to spend \$2,500 every two years for a new box." Dvorak should stop going to Comdex shows and get into the real world. Let him visit the average doctor or small business or home and see how many of them have upgraded in the last two years just because of something new on the market. Unless it's necessary, you don't replace your computer until you're left with no other choice.

*Duane Sweet
Ashville, North Carolina*

Dvorak underestimates the personal nature of personal computing in business by suggesting that organizations will move toward "a single point of upgrade" because businesses "can't afford the expense of upgrading 10,000 CPUs every 18 months." I believe that the overwhelming success of PC-based computing is due to the personal empowerment it has enabled, and that successful information strategies in the future will be those that recognize and take advantage of the personal nature of PCs. If home computing is eager for powerful platforms, it's unlikely

that corporate technology planners will be able to sell the average worker anything less.

*Gary H. Huggins
Mississauga, Ontario, Canada*

SEX, VIOLENCE, AND TRADE SHOWS

I applaud Bill Machrone's stand against sexism and violence at trade shows ("Trade Show Travails," November 23, 1993). I often see other columnists make disparaging remarks about models employed during computer shows and their lack of technical expertise, but Machrone is the only writer I've seen who places the blame where it belongs: on the companies who stage the exhibits. He recognizes that in condemning the model we are "blaming the victim." We should be condemning the victimizers, namely the companies who create such an uncomfortable role for the models.

These companies have at least two ethical ways to proceed: to select their representatives on the basis of technical knowledge rather than good looks, or, perhaps the more interesting option, to provide technical training to whomever they select to represent their company and products. Machrone, thank you for unmasking the situation.

*Ed DeJesus
via PC MagNet*

UNCOMPRESSING DOUBLESPEACE

Thank you for your reasoned and informative article on MS-DOS 6.0 DoubleSpace and real-time disk compression ("DOS 6.0's DoubleSpace: Is It Safe?," November 23, 1993). Your avoidance of sensationalism on the subject is both rare and appreciated.

*Joseph Lewis Loutzenhiser
Ashland, Oregon*

WAVETABLE SYNTHESIS MAKES WAVES

I'm no historian, but I take issue with the implication that wavetable synthesis was "pioneered by Ensoniq Corp., the makers of professional keyboards, in 1984," and that wavetable synthesis was "Ensoniq's discovery" ("Catch a Wavetable," Trends, November 23, 1993). Patents

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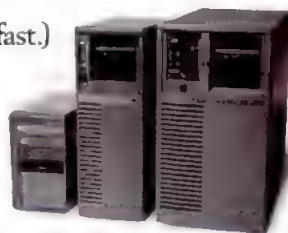
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LETTERS

owned by the Allen Organ Company regarding wavetable synthesis were filed in the 1960s. Allen's first digital organ was introduced in 1971, based on this wavetable technology.

*John P. Adamson
Macungie, Pennsylvania*

DREAM ON

Bravo to Bill Howard, whose column "Building My Next Dream Machine" (December 7, 1993) was right on target. Features such as clearly labeled I/O ports are a real dream of mine. I'm no slug when it comes to I/Os, but if a port has been unused for a while and I'm ready to reconnect, let's just say it's easier to take off the cabinet top to tell for certain what port is at what connector. Real, user-friendly features for our high-technology products—what a concept.

*James Guilford
Cleveland, Ohio*

WHERE'S THE IMMINENT DEMISE?

I have read all of the computer magazines, including yours, discussing the imminent demise of DOS, but the article "Cooking and Computing with Microsoft's DOS 6" (Read Only, November 23, 1993) seems to refute that. You stated that there are over 70 books out covering the DOS 6.0 upgrade alone. I'd like to think DOS is still alive and very well, and evidence such as this supports my case.

*Sean Chang
via PC MagNet*

COUPONS = VAPORWARE = POOF!

Robin Raskin has hit the nail on the head so often in her Pipeline column that I'm starting to get headaches contemplating the issues she brings up. As for Raskin's piece "A Coupon for Your Thoughts" (November 23, 1993) on the coupon phenomenon, I concur with her view that consumers should be wary of any vendor offering a coupon in place of an actual product.

In November, I purchased and received the Microsoft Office 4.0 version upgrade. I was told by Microsoft representatives that this package would contain Word 6.0 and current versions of Excel and PowerPoint

along with an automatic upgrade voucher for those products once they become available. In actuality, all I received was Word 6.0 and the upgrade coupons. It is disheartening to receive from vendors a thin piece of paper in place of an actual product.

*Daemin Kim
Northridge, California*

ALL'S FAIR IN LOVE AND WAR

Since when have one's achievements become public domain? In Robin Raskin's October 26, 1993, column she quotes Barry Simon as saying, "Microsoft applications developers have a distinct advantage over other developers." She goes on to say, "As the provider of both operating systems and apps, Microsoft must make sure that its apps groups are not handed bits of OS technology that are not given to other developers."

In other words, it is Microsoft's responsibility to see that its competitors can bury it? I find it highly amusing and indicative of our society's sorry state that Microsoft's competitive behavior is labeled as "anti-competitive" by government and other companies that cannot provide as much value as Microsoft can.

*Kenneth L. Beal, Jr.
Pompano Beach, Florida*

ATTENTION, SHOPPERS!

John C. Dvorak missed the point when he dumped on software distribution through locked programs on CD-ROMs and hard disks ("Coming to CD-ROM near You," November 23, 1993). Of course the stores won't like it. Nor will the people who print the pretty boxes or the distributors who keep most of the money. CD-ROM distribution creates a direct link between program designers and end users. This is a boon to consumers, who instead of making decisions based on cardboard packaging can now select software based on content. Along with hardware and other ideas unique to the information age, this concept is potentially revolutionary.

*Dick Ainsworth
Ridgeway, Wisconsin*

WORDPERFECT NOT PERFECT?

Your First Look of WordPerfect 6.0 for Windows ("WordPerfect 6.0 for Windows Heads into New Territory," December 7, 1993) was very informative, even for one

who is already using the program. Though it was well balanced, with marks for and against, it concentrated more on features and less on the crucial point of performance.

*Norman Zacour
Kingston, Ontario, Canada*

It puzzles me that your First Look of WordPerfect 6.0 for Windows had so little to say about the program's unreliability. Sophisticated users keep their fingers crossed in fear of mutilated files and printing artifacts. My private suspicion is that today's behemoth applications fail to deliver when one tries to really use all that supposed power, and that one would be better off with several smaller, more specialized programs.

*Siep Kroonenberg
Groningen, The Netherlands*

CORRECTIONS AND AMPLIFICATIONS

PC Magazine's "10th Annual Printer Issue" (November 23, 1993) said that the Epson Stylus 800 ink jet printer does not support legal-size paper. In actuality, Epson America confirms that, although this is not stated in the specifications, the Stylus 800 can print on legal-size paper when using the manual feed.

In the "486 Buyers' Guide" (December 7, 1993), the correct toll-free number for Compaq Computer Corp. is 800-345-1518.

A brief in New & Improved (December 7, 1993) incorrectly described the pricing scheme for the Bitstream Typeface Library. Pricing for the 1,100-typeface library starts at \$32.25 per typeface.

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CIRCLE 063 ON READER SERVICE CARD

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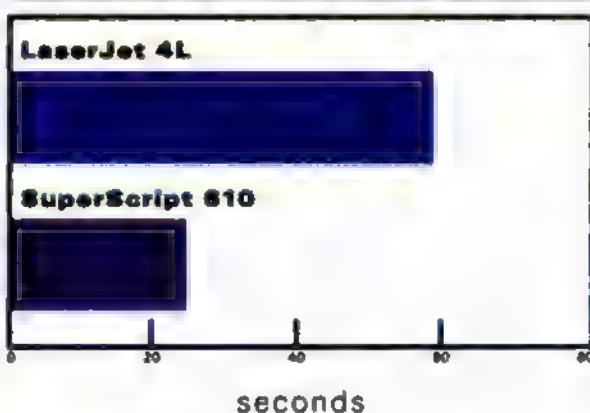


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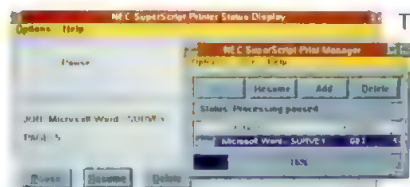
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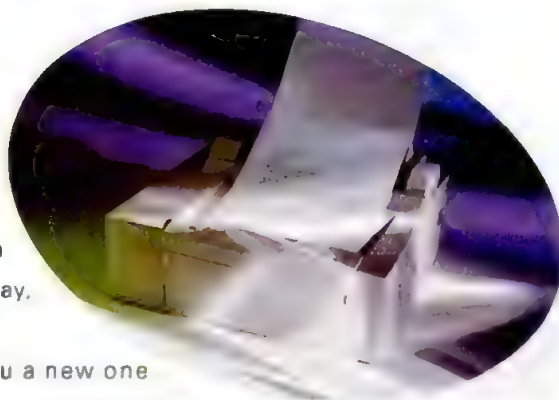
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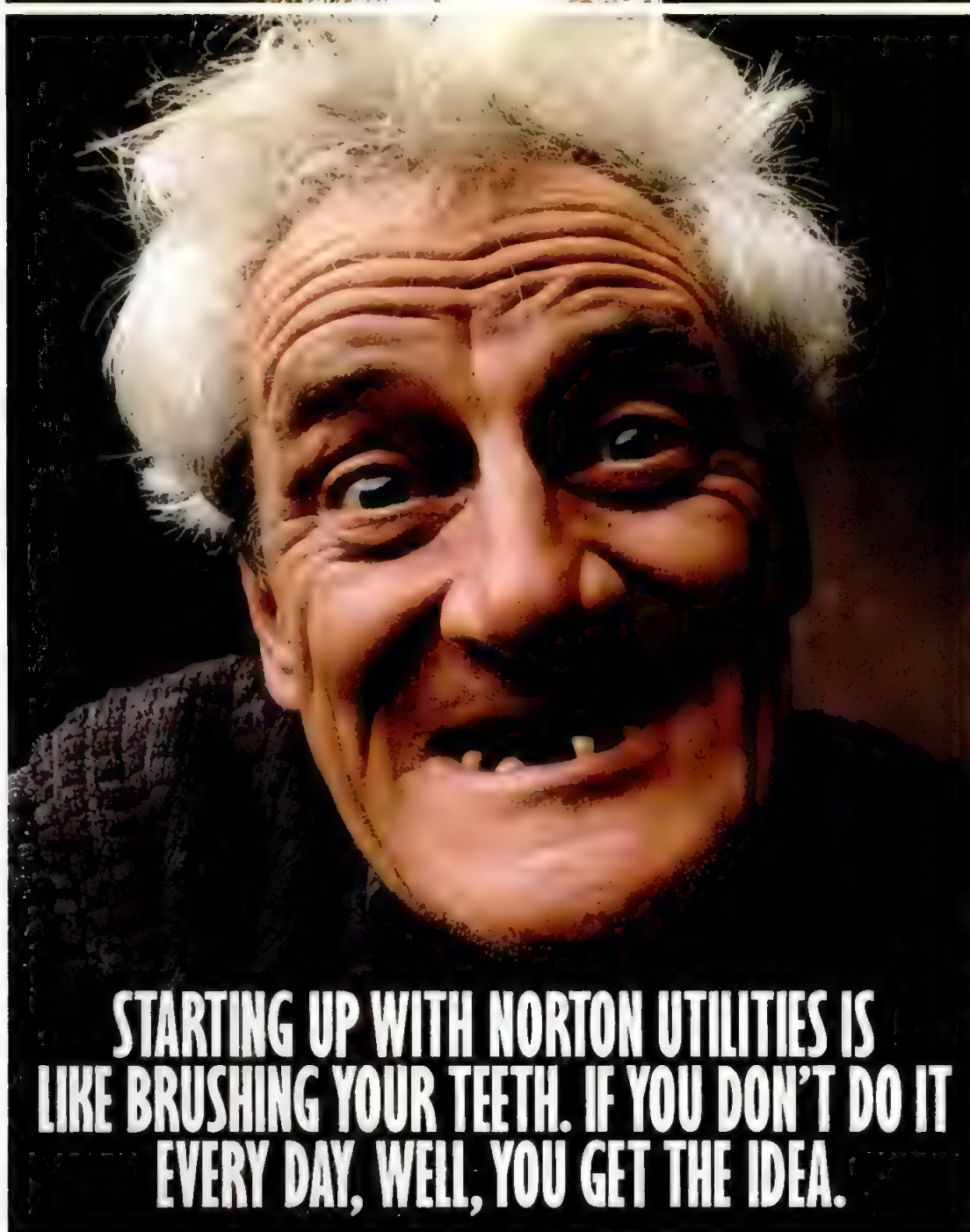
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CIRCLE 334 ON READER SERVICE CARD

Trends

TRENDS & TECHNOLOGY SHAPING THE PERSONAL COMPUTER MARKET

Big Business Goes Home

Consumer software market heats up.

It looks as if 1994 will be the Year of the Consumer, as some of the largest software companies are adding titles targeted for kids, families, and the small-office crowd. Microsoft is extending its Microsoft Home line—which contains CD-ROM

titles such as Cinemania, Dinosaur, and Encarta—with inexpensive non-CD-ROM paint and productivity applications for children. This year, WordPerfect's consumer division will also roar into the consumer software market, which some consider the fastest-growing market segment, by offering 50 Main Street packages, all priced under \$150.

Developed for children and novice computer users, applications for the consumer market will have a different look from that of business programs. "We started with a clean whiteboard when we designed the Main Street user interface," says Jeff Mallet, senior director of WordPerfect's consumer division. "The keyword is simplicity. All the applications are easy to install, and none of the documentation is over 150 pages."

Among Main Street's products are WordPerfect Works 2.0 for Windows (there is no 1.0) and a personal information manager code-named CIA. CIA will come with four information bases that contain the addresses and telephone numbers of computer hardware and software companies, as well as the top 500 consumer product companies. For travelers, it will offer names and addresses of hotels, restaurants, and car rental agencies. It will also offer a list of popular wines.

Later this year, WordPerfect plans to launch children's entertainment and educational programs on CD-ROM. And a kid's version of WordPerfect, with an interface that children can easily navigate, is under development.

The first two children's applications from Microsoft are Fine Artist (a paint and design program) and Creative Writer (a word processor). In terms of interface design, both programs break the rules established by other Microsoft applications and appeal more to Nintendo players than to database users. For example, to bring up help, the

child simply clicks on a cute-looking helper rather than hitting the F1 key.

Over the next few years, Microsoft plans to ship hundreds of consumer titles—games, productivity applications, and references—targeted at the small-business, home, and education markets.

—Christopher Barr



Video Velocity

EVERYONE KNOWS THAT BIGGER IS better. First microprocessor muscle progressed from 8 bits to the Pentium's 64-bit bus, and now video accelerators are moving from 32- to 64-bit interfaces. 64-bit video boards are desirable primarily for high-resolution applications such as desktop publishing, image editing, and CAD/CAM, where a resolution of 1,280-by-1,024 and 16.7 million colors makes graphics easier to work with.

What factors affect video performance? The bandwidth of the video chip determines how fast the board processes graphics instructions and how fast chunks of video are sent to and from the memory area called the frame buffer. A video chip with a 64-bit internal architecture and a 64-bit memory interface should outperform 32-bit video chips simply because the larger chip can process twice as much information.

Another factor is the type of video memory installed on the board. Most 64-bit video chips take advantage of VRAM's (video RAM) block-write capability, which pushes

blocks of pixels through the memory interface faster than with a DRAM (dynamic RAM) frame buffer. VRAM is dual-ported, which means it can transfer video bits twice as fast as single-ported DRAM. And since VRAM can address more memory than DRAM can, VRAM-based boards can produce more colors (bits per pixel) than DRAM-based boards.

Matrox was the first to use a 64-bit video chip, and its Ultima video boards were selected as an Editors' Choice ("Pumping Pixels," December 7, 1993) for high-resolution boards. S3, which sells its chips to video board makers, recently introduced two 64-bit video chips: One uses VRAM for the best performance, another uses DRAM for less expensive applications. We expect the first 64-bit S3 boards to hit the market shortly. Sources say ATI Technologies is also readying a 64-bit chip.

Boards based on 64-bit chips will cost about \$100 more than 32-bit boards because of the special digital-to-analog converters (DACs), not to mention the extra memory to pump all those pixels.

—Christopher Barr

Pipeline *By Robin Raskin*

For Lenny Bruce

Dear Lenny, As someone who was always fascinated by language and what a warped human mind could do to it, I thought I'd tell you about what's been going on at Microsoft these days. I think you'd have a real picnic building a monologue out of the language these guys have cooked up to explain object-oriented programming. After much deliberation, I can only attribute it to what I call a high level of tech-tosterone in their blood. I think it's the same tech-tosterone that drives the quest for faster chips, faster screen redraws, and faster cars, but I'm not certain.

My theory, which jelled during a Comdex walk-through of the Visual Basic booth, is that these guys are attributing oddly anatomical qualities to objects. Objects, for your information, are data structures that store information but have prescribed behavior as well.

Anyhow, the Visual Basic booth at Comdex was filled with all sorts of third-party controls. Controls are identifiable because they're smaller than full-blown applications. In case you care, they're typically distributed as DLLs (dynamic link libraries) and not as executable programs. The little mini-programs I looked at did all sorts of cool things, from integrating voice messaging with your e-mail to testing your cardiovascular fitness. Language aside, they're probably the best indication of what the future of applications looks like.



So, in the first five demos I went to, I listened with knit brows, trying to make sense of this newly created language. Five times I listened to how they'd accomplished their particular programming magic simply by "exposing their objects" to the API (application programming interface). Exposing their objects! Lenny, can you believe how much trouble you got into when you talked about the same thing! I guess when it's written in code it's different, huh?

Grilling these developers further, I learned that most of them were inserting their objects into containers, which I suppose is understandable once you're sitting around with naked objects. But I really lost it when they started to get into "public and private members" of their object classes. To tell you the truth, I was getting pretty nervous about asking any more questions.

Some of our readers may read this and accuse me of having a warped mind. Others may say I read too much William Safire—and get too caught up in language. But Lenny, I know you'll understand. I'm sure tech-tosterone has the foundations for a great routine. If you have any pull with Leno, Letterman, or any of the other modern-day linguists with a good sense of humor, please let them know about objects. There's a world of late-night humor in them.

Your fan,
Robin

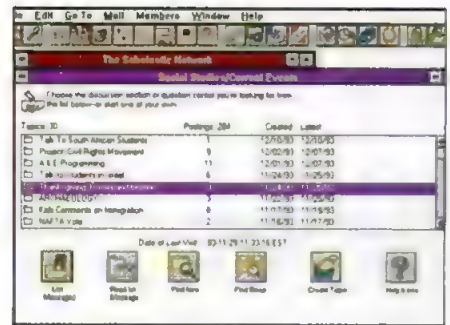
Robin Raskin is the editor of PC Magazine.

Electronic Field Trips for the '90s

MAKES YOU WISH YOU WERE BACK in school. Two innovative projects in educational technology are helping to reshape the classroom by connecting youngsters across the U.S. with their peers around the world.

These projects are representative of a promising outlook for technology in the class-

room, supported by some recent trends. American schools spent nearly \$2.1 billion on educational technology in the 1992 to 1993 school year, an increase of nearly 20 percent over the previous year, reports the Software Publishers' Association. The ratio of students to computers is down to 16:1 compared with 125:1 ten years ago. And plans for future purchases put the PC and Macintosh neck and neck, according to Quality Education Data in Denver. Meanwhile, the Organisation for Economic Cooperation and Development in Paris predicts that by 2005, each child's desk



The Scholastic Network's forums show kids it really is a small world after all.

will have its own PC.

The Global Schoolhouse, funded in part by the National Science Foundation, had such a successful pilot run last spring that a second program began in January for the second school semester. "It's electronic enablement in the classroom," says Don Mitchell of the NSF. Around 20 American schools will participate in research projects such as space exploration via electronic videoconferencing. In time, schools from Canada, Mexico, Japan, Australia, and European countries will join.

Cornell University developed the Mac and PC software, called CU-SeeMe, which allows live, multipoint video at 12 to 15 frames per second over the Internet using phone lines; audio transmission is not yet available. Some sites will use Ethernet over TV cable channels, which, Mitchell says, "demonstrates that there are technologies for interactive connectivity already in place that do not require additional infrastructure investment."

Meanwhile, the Scholastic Network (800-246-2986), available on America Online, is a service geared towards the K-12 set. Expanding the traditional parameters of the classroom, Scholastic Network accesses such information resources as the Library of Congress, the Smithsonian Institute, the CNN NewsRoom, National Geographic Online, and Scholastic's on-line publications. Students can participate in writing workshops with authors, develop math skills, and debate social issues on interactive forums. And teachers can share ideas in professional forums, obtain advice from experts and colleagues, and download free educational resources.

Of course, there are still strides to be made in the classroom. More than a million and a half Apple II (circa 1977) and IIGS machines are in use, nearly 45 percent of computer hardware is five years old or more, and the majority of PCs cannot run Windows. —Melissa J. Perenson

Plug and Pray

THE PLUG-AND-PLAY INITIATIVE, which makes auto-configuration of add-in boards possible, will hit a fever pitch this year as system and board makers join in the effort with Microsoft.

The goal of Plug and Play (PnP) isn't new. Apple has been automatically configuring add-in boards for years, and IBM's Micro Channel architecture (MCA) could do it when it was introduced in 1987. But PnP is the first industry-wide effort for PCs. The worst complaint is that IBM should have established this type of feature when it introduced the first PC in 1982.

The concept behind PnP is simple. When you install a new hardware device—whether it's a sound board, video board, network card, SCSI controller, PCMCIA card, or hard disk—your PnP system will automatically identify the new component. PnP will then take the device through a configuration process that automatically allocates the interrupts, I/O, and memory addresses without making you fumble with jumpers or pins. PnP will even reassign interrupts when two boards demand the same memory address. (Your existing non-PnP boards should still work in a PnP computer.)

In reality, Plug and Play is Microsoft's ploy to make a computer's BIOS obsolete. Sources even report that Microsoft employees have been seen wearing T-shirts that read "BIOS? We don't need no steenking BIOS!" While it will take many years for

ant system requires a PnP BIOS, PnP add-in boards, and a PnP operating system. Microsoft is working on the operating system, which will be a component of the next version of Windows—code-named Chicago—but it's not actively supporting PnP on DOS or even Windows 3.1. Pre-Chicago PnP compliance is handled by third-party utilities, such as the one supplied by Intel, which will give some boards and systems limited PnP capabilities.

Until Microsoft can achieve its goal of eliminating the BIOS, Phoenix and SystemSoft will use their PnP BIOSes in systems due later this year. Although first developed for ISA buses, PnP will work with all the major buses—PCI, VESA, EISA, MCA, and PCMCIA. We expect that notebooks will be the first PnP systems, since manufacturers need only address the PCMCIA bus, which can be handled by the new PnP BIOS—and doesn't require Chicago.

—Christopher Barr

Endorsing NAFTA

THE GIANT SUCKING SOUND YOU are about to hear may be dollars flowing north as U.S. PC and software vendors find a growing market in Mexico in the wake of the North American Free Trade Agreement.

Many PC executives agree that NAFTA, which eliminates 70 percent of Mexican tariffs on U.S. computer equipment and the 10 percent tariff on U.S. software, can only benefit the U.S. computer industry. No tariffs on American computer equipment, they say, equals more sales in Mexico.

Indeed, the Mexican market for computer hardware and software is projected to be one of compelling growth. And while economic theory may not always translate into reality, the hardware and software industries have given NAFTA their blessings.

Market research firms International Data Corp. and Dataquest report that Mexico is a rapidly growing market. The size of the computer hardware and software market by the end of 1993 was \$3.2 billion, says Paul Pastrone, IDC Latin America market analyst. Of that amount, system hardware (PCs, minicomputers, and mainframes) claimed \$1.75 billion; software, \$395 million; data communications, \$71 million; and support and professional services, \$954 million.

Dataquest estimates that growth in Mexico will be up to \$1.41 billion by 1995. Hardware executives tout the eliminated tariffs that will reduce prices and open up the Mexican market further, while software

Top Retail Software

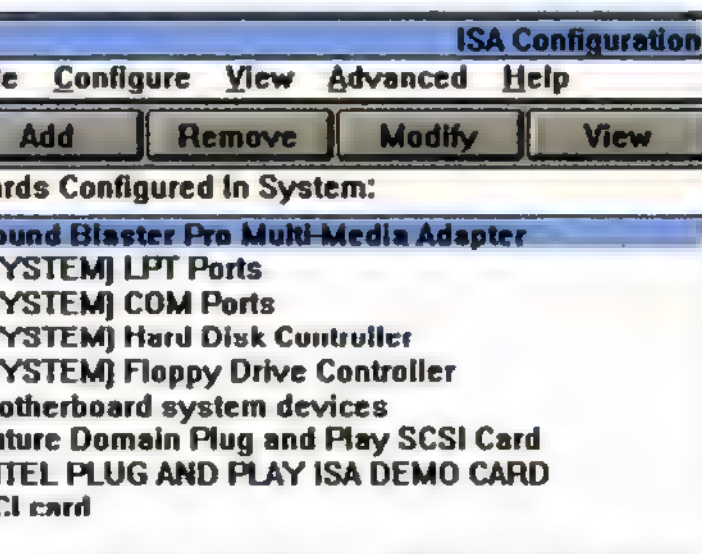
Current ranking	Last issue	Product/company
1	1	MS-DOS 6.2 Upgrade Microsoft Corp.
2	—	Adobe Type Manager Font Pak Adobe Systems
3	—	TurboTax for Windows HeadStart 1993 ChipSoft
4	8	TurboTax for DOS HeadStart 1993 ChipSoft
5	4	Quicken 3 for Windows Intuit
6	—	MS Works 3.0 for Windows Microsoft Corp.
7	10	Quattro Pro 5.0 for Windows Borland International
8	5	MS Windows 3.1 Microsoft Corp.
9	7	MS Office 4.0 for Windows Microsoft Corp.
10	3	MS Office 4.0 for Windows Upgrade Microsoft Corp.
11	—	MS Windows for Workgroups 3.11 Microsoft Corp.
12	—	WordPerfect 6.0 for Windows WordPerfect Corp.
13	6	Quicken 7 for DOS Intuit
14	—	Expert Fonts Bundle for Windows Expert Software
15	—	Procomm Plus for Windows 1.02 Datastorm Technologies

This list ranks PC business programs according to the total number of copies shipped to stores and resellers in the week ending November 27, 1993. The list is based on shipments to more than 12,000 retail locations. It does not include sales made directly by software publishers and cannot be interpreted as a picture of the entire software market. Sales information adapted from a compilation by Ingram Micro.

vendors cite NAFTA's intellectual property provisions, which will protect software packages as literary works. The Business Software Alliance reports that in Mexico in 1992, the U.S. software industry lost \$206 million to pirated software, and that 85 percent of the software in Mexico is pirated.

Besides IBM (which employs 1,800), major players in Mexico include Acer, Compaq, Dell, Digital, Hewlett-Packard, and Key Tronic. Dell employs about 40 at its plant in Toluca, Mexico, where workers put CPUs and memory modules on motherboards. Dell's subsidiary in Mexico City is one of the fastest-growing in the company's history, second only to its Japanese subsidiary.

—Brendon Macaraeg



Intel's configuration utility is included in its Plug and Play kits for add-in board makers.

Microsoft to eliminate the need for a BIOS totally—by building a hardware interface into a future operating system—Phoenix Technologies and SystemSoft have developed BIOSes that will help usher in Microsoft's Plug and Play vision.

To succeed, PnP is going to need time, cooperation, and more time. A PnP-compli-

How Far Out Is Nanotechnology?

Ever wonder what computers will look like in the next century? Rest assured, a group of scientists is pondering this very question. In fact, they already have some clever ideas.

Consider a sugar cube. Imagine that a microprocessor—even hundreds or thousands of them working in parallel—and all the trimmings of a PC fit within those dimensions. To some scientists at IBM, MIT, and Xerox PARC, this seemingly absurd vision isn't so farfetched. They're proponents of molecular manufacturing, otherwise known as nanotechnology.

Molecular manufacturing is based on precisely controlling the manufacturing process of a broad range of mechanical devices. Each atom is individually moved into place by an *assembler*, a tiny programmable device with a robotic arm and an on-board computer.

Why would this level of control be needed? Because rapid advancements in faster, more powerful, and smaller components will eventually outpace the technology used to build the components. Chips will be so small that we'll need new techniques to build them.

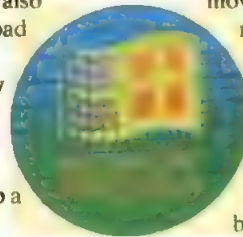
"Suppose someone gave you a Lego set and you had boxing gloves on. It would be hard to build anything. If you take the gloves off, you could snap together the blocks easily. Now we're just learning that we can take the boxing gloves off," explains Dr. Ralph Merkle, who runs the Computational Nanotechnology Project at Xerox PARC.

To get a sense of just how small "small" is, look at the Pentium chip. It's manufac-

CRACKDOWN ON COUNTERFEITERS.

Microsoft estimates that one out of every two copies of Windows in use worldwide today was obtained illegally, and it's decided to fight back by introducing a "driver refresh and anti-counterfeiting release"—Windows 3.11.

The new version, released in January, doesn't offer any new functions. It adds only updated drivers for new printers and displays (they're also available from Microsoft's download service) and drops the NetWare shell and IPX protocol supplied by Novell. By designing the box with a "certificate of authenticity" that includes a difficult-to-reproduce hologram, Microsoft hopes to curb a serious case of counterfeiting.



The details of the gray-market are sketchy. When Windows is preinstalled on a PC, Microsoft has sold that software—along with the right to reproduce the disks and manuals—at a special price to the PC maker. Legally, the software is not meant to be unbundled from the PC. In the past, Microsoft has allowed any printer to reproduce the manuals and disks for the PC maker. By

moving to "authorized replicators" from which PC makers can choose, Microsoft will be able to control manufacturing more effectively and help put counterfeiters out of business.—Carol Levin

tured using what's called the 0.8-micron process and will be moving to the 0.6-micron process. These figures reflect the width of the *wire traces* that connect the Pentium's 3.2 million transistors created through *photolithography*—the chemical-based chip-making process. "Lithography has plenty of performance left in it for the next five to ten years. Then it'll get harder to make improvements," explains Merkle.

Enter molecular manufacturing, where measurements are made not by micron but by nanometer, which is a thousand times smaller than a micron in linear dimensions and a billion times smaller in volume. "Molecular manufacturing by definition is

'almost every atom in the right place,' so you can build anything that's consistent with laws of chemistry and physics," says Merkle.

This possibility was recognized 35 years ago by physicist Richard Feynman, who explained, "The principles of physics, as far as I can see, do not speak against the possibility of maneuvering things atom by atom. It is not an attempt to violate any laws. It is something that can be done, but in practice, it has not been done because we are too big."

Sounds feasible on paper, but skepticism abounds. The only molecular machines that exist today are modeled on computers. Meanwhile, more conventional techniques are producing smaller and smaller compo-

nents. Hitachi has demonstrated a single electron memory device that stores one bit of information. Texas Instruments has produced a miniature chip with components 50 times smaller than usual. And Toshiba has made a transistor that's 0.04 microns wide.

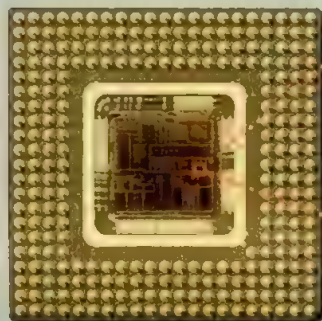
The Japanese are also investigating molecular manufacturing. "While the U.S. is in a good position because there are excellent scientists working on basic research," says Merkle, "broadly speaking, the Japanese are ahead of us. We're at a point where technology shows that it's feasible. The fundamental issue is putting together a directed effort to achieve the objective."

So how far out is nanotechnology? Estimated time of arrival is between 2010 and 2020.

—Carol Levin

A Billion Times Smaller, In Theory

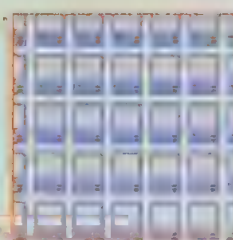
Dr. K. Eric Drexler, author of *Nanosystems*, predicts that a technological revolution will take place around 2010, when tiny computers will be fabricated on the molecular scale. To grasp just how small nanomachines are: A micron is one-millionth of a meter; the width of a human hair is 100 microns. The width of the channel that turns the Pentium's 3.2 million transistors on and off is 0.8 microns. There are 1 billion cubic nanometers in 1 cubic micron.



Pentium chip
(shown three-quarter-size)



Transistor
(magnified 25,000 times)



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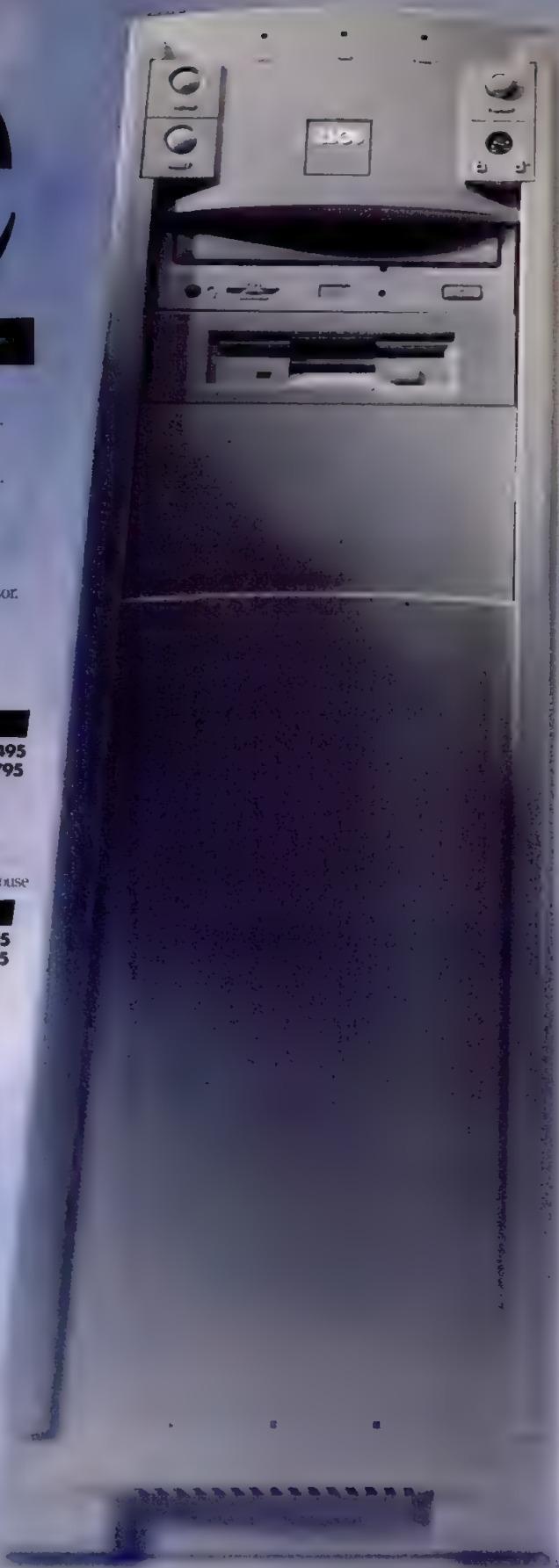
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- Choice of Lotus Windows Application

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CENTRAL POINT

First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

■ RISC-Based Systems Emerge

IBM's RISC System/6000 Puts The Pentium on Notice

BY DAVID WILSON

What costs \$11,000, doesn't run Windows or DOS applications directly, yet needs to be understood by anyone considering high-end PC purchases in the next two years?

The IBM RISC System/6000 Model 250, one of the first machines based on the jointly developed PowerPC chip, holds the honor of that price tag, and quite possibly should hold your attention, too. But why, with Pentium machines now available, should you care about somebody else's new, nonstandard CPU? For a number of reasons: performance, price, size, and the possible eventual support for a wide variety of operating systems.

The POWERstation 25T is the high-end model in IBM's RS/6000 Model 250 system series. What differentiates the Model 250 series from other RS/6000 models is the use of the new PowerPC 601 (PPC601)

RISC (reduced instruction set computer) processor jointly developed by Motorola, IBM, and Apple.

The PPC601 is the first of many microprocessor implementations planned for the PowerPC family of RISC chips.



BIG POWER with an \$11,000 price tag.

Derived from the single-chip version of IBM's POWER (Performance Optimization With Enhanced RISC) architecture called the RSC (RIOS Single-Chip), and using bus interface components from Motorola's 88110 RISC processor, the

PPC601 is a high-performance 32-bit RISC processor. Systems in the RS/6000 Model 250 series run AIX, IBM's version of Unix; they have substantial expansion capability and low prices (for Unix machines), and are extremely fast for entry-level workstations.

IBM has been researching

systems based on RISC processors for years. RISC chips run faster than most traditional microprocessors because of the comparatively simple instruction sets they use. A program compiled to run on a RISC system is likely to be larger (with more but simpler instructions) than the same program on a CISC (complex instruction set computer) system, such as any PC powered by the Intel 80x86 processor family. But the RISC processor will run the program faster than the CISC.

With its native PPC601 RISC
Continues on page 38

■ CD-ROM Takes a Faster Spin

NEC's MultiSpin: Triple Speed for Better Multimedia

BY JOHN R. QUAIN

The increasing popularity of multimedia CD-ROM software titles is about to get another boost from the hardware side. NEC Technologies, the company that made CD-ROM performance bearable by introducing the first double-speed drive in January 1992, has raised the bar once again with the NEC MultiSpin 3Xe, the first single-disk triple-speed CD-ROM drive.

With an estimated selling price of \$600, the MultiSpin 3Xe boasts an average access time of 195 milliseconds and an average sustained data throughput of 450 kilobits per second, three times the throughput of single-speed models. Technically similar to the approach taken in double-speed CD-ROM players, the triple-speed MultiSpin 3Xe plays back and

decodes the text, graphics, and video files on data CD-ROM disks at three times the standard rate, while dropping back to 150 Kbps to play back standard Red Book audio from compact disks.



450 Kbps: To make images move.

The MultiSpin 3Xe features an on-board memory cache of 256K and is able to read all standard CD-ROM disks, including multisession (incrementally updated) Kodak Photo CDs and
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First Looks

IBM RS/6000

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processor, the RS/6000 Model 250 can run DOS or Windows apps through emulation or translation software. The AIX operating system will optionally include Windows support using WABI (Windows Application Binary Interface) technology developed by SunSelect and IBM (the emulator was unavailable for testing at press time). Emulated DOS performance on any of the RS/6000 Model 250s is expected to approach 25-MHz 486 performance for emulated applications.

FIRST FORAY

The RS/6000 Model 250 system class has a basic list price of \$4,795, but in the workstation world, that means "starting point," not "low-end system price." The basic-configuration machine has 16MB of RAM and a standard set of interfaces (two serial, plus parallel, SCSI, and Ethernet), but no software, disk drives, keyboard, mouse, or video board/monitor.

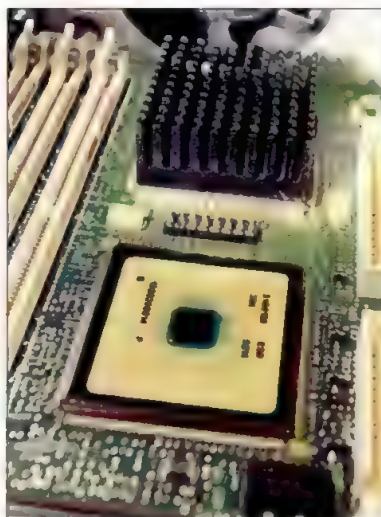
IBM offers three configured packages based on the RS/6000 250. The POWERserver 25S, \$8,945, is a server and, in the low-end configuration, has a 1GB disk and eight serial ports. The POWERstation 25W, \$7,595, has a 540MB hard disk, a mouse, and a 1,024-by-768 video board. The POWERstation 25T, \$9,395, comes with a high-performance 1,280-by-1,024 video board and 17-inch monitor, 540MB SCSI hard disk, and mouse.

\$11,000 WORTH OF POWER

The system we looked at, a POWERstation 25T configuration, included a 1GB hard disk, 32MB of RAM, and a floppy disk drive. This raised the price to \$11,268. AIX Unix software needs to be licensed, and we also needed the optional Fortran compiler. Together, the two cost an additional \$1,873.

From the outside, the POWERstation 25T looks a lot like a PC. The box is a small desktop machine, 3 by 16 by 16.5 inches (HWD). The keyboard and mouse could belong to a PC as well. Inside, there are eight

SIMM sockets, for PS/2-style SIMMs. System RAM totals from 16MB to 256MB are possible. Supplementing the standard interfaces are two Micro Channel slots for expansion. The machine has one bay for a 3.5-



POWERPC: The PPC601 CPU sits under a large heat sink (top).

inch floppy disk drive and one for a 3.5-inch SCSI hard disk (sizes from 540MB to 2GB are supplied by IBM). Additional peripherals and disk expansion

are supported through the external SCSI interface. One additional slot in the system is a "PowerPC local processor bus slot" designed for IBM's high-performance IBM GXT-150 graphics adapter.

ONE SYSTEM CHOICE

The RS/6000 Model 250 series was developed by IBM's Advanced Workstation and Systems Group (AWS) and is the first to use the PPC601 chip. At the same time, IBM's newly announced Power Personal Systems Division will focus development efforts on desktop, server, and portable systems based on the PowerPC architecture. PowerPC-based personal computers will run both native ports and

emulated versions of several PC operating systems. Apple, for example, will use the PPC601 in a forthcoming series of Macintosh products, running a native version of Apple's System 7 operating system.

Currently, only AIX Unix is available as an operating system for the system we tested. The long-term plan is to create an underlying kernel (based on the Mach operating system), and on top of that add services to support Unix (IBM's AIX and Sun's Solaris), Windows NT, OS/2, and the object-oriented Taligent operating system (from an Apple/IBM development project), all in native modes. Additionally, there are plans to support DOS, Windows, and Macintosh applications using compatibility and emulation techniques. Note that

these operating system plans are for the PPC601 chip and some future machines based upon it. We have no indication of when or if the POWERstation 25T we looked at will be able to support all of the planned operating systems.

Essentially, the promising RS/6000 Model 250 series suffers from the chicken-and-egg problem: Will a native application become so popular that people will buy one of these systems simply in order to run it? Or will the RS/6000 Model 250's price and performance attract sufficient numbers of workstation customers for system and application developers to rewrite code so that their products can run, in native form, on the new platform?

• List price: *IBM RISC System/6000 POWERstation 25T, with 17-inch monitor, 540MB SCSI hard disk, mouse, AIX/6000 2-user licence, and AIX windows Environment/6000, \$9,395. IBM Corp., Old Orchard Rd., Armonk, NY 10504; 800-426-2255.*

Circle 426 on reader service card

■ Power past the Pentium?

No doubt about it, the IBM RISC System/6000 POWERstation 25T is a fast system. In the Unix world, a performance is often measured by the SPEC tests, with separate tests for integer and floating-point performance. IBM rates its system at 62.6 integer SPECmarks and 72.2 floating-point SPECmarks. We verified these performance levels in our testing.

The SPECmark results for the POWERstation 25T are similar to those claimed by the 66-MHz Pentium chip, but in our informal testing we found that with the Pentium, most compilers generate performance levels much lower than their optimum. While simple IBM optimization gives 75 percent of the expected SPECmark performance, we typically saw only about 40 percent

of the claimed SPECmark performance on a Pentium, which was due to the less-than-optimal compilers often used for Intel machines. This tends to give IBM a major performance advantage (up to 100 percent) when comparing two similar programs on the POWERstation 25T and on a Pentium-based system. Typically, we saw a 300 percent or better advantage for the IBM machine over the fastest 486-based systems.

Many floating-point-intensive tests run twice as fast on the POWERstation as they do on a Pentium machine: floating point is a strength of the RS/6000 line.

Overall, we found IBM's POWERstation 25T the fastest machine we've tested in the \$10,000 price vicinity.—DW

NEC CD-ROM

CONTINUED FROM PAGE 37

CD-ROM XA disks. Dust is kept at bay using a double-door system and an automatic internal lens cleaner. On the rear panel are two SCSI connections for daisy-chaining other devices and stereo audio outputs for hooking up a sound board or external speakers. Our evaluation unit included the \$125, 16-bit ISA SCSI controller card option, and installation proved to be trouble-free, thanks to an automated DOS software installation routine.

THE FIRST HEAT

Tests conducted on the MultiSpin 3Xe revealed its prowess in handling popular multimedia reference disks, but uncovered some shortcomings of NEC's design as well. In standard 16K-block sequential read tests, the MultiSpin 3Xe is 50 percent faster than double-speed drives. The test score of 445 Kbps closely matched NEC's 450-Kbps rating.

In addition, the MultiSpin 3Xe did substantially better than the vast majority of double-speed drives in playing video from a multimedia disk. In playing back a 320- by 240-pixel AVI video file it dropped only 18 frames, where most double-speed models dropped anywhere from 45 to over 200 frames in the same test. Consequently, the MultiSpin 3Xe makes video clips appear smoother and more realistic, easily exceeding the Multimedia PC (MPC) Level 1 and 2 requirements.

Two tests in which results were not as exceptional involved simple and complex (Boolean) searches in standard text databases. While still quicker than most double-speed models, the MultiSpin 3Xe's performance was matched by some of the faster double-speed drives with which we compared it. Furthermore, the MultiSpin 3Xe was able to load large TIFF graphics

■ Triple Is Fast, but Quad Is Faster

The NEC MultiSpin 3Xe is exciting, but the MultiSpin 4X Pro, a quadruple-speed 600-Kbps drive priced at around \$1,000, is sure to grab even more headlines.

Aimed squarely at power users, the 6-pound MultiSpin 4X Pro should surpass the MultiSpin 3Xe's fastest data-retrieval speeds, accessing data in under 200 milliseconds. Data transfer will be fast, too, at around 600 Kbps. NEC also promises burst-transfer rates equal to those of the 3Xe. The CD-ROM reader/player should be especially appealing to those looking for fast video performance. Both the MultiSpin 3Xe and the anticipated MultiSpin 4X Pro use faster rotation and decoding schemes to rev up data-retrieval and transfer rates.

Like its 3Xe sibling, the Multi-

Spin 4X will feature self-installing tutorial software, an ergonomic design, a rotating double dust door, front-panel LCD controls with modes for data, audio, and diagnostics, and a two-year limited warranty. Included in the purchase price will be a SCSI data cable, disk cartridge, and power cable.

For those with more to spend and a yen to have the latest technology now, Pioneer is already selling a jukebox-style quadruple-speed CD-ROM changer. The Pioneer DRM-640X lists for \$2,045 and can handle up to six disks at once. In PC Labs' testing, it beat the NEC MultiSpin 3Xe's throughput speed by nearly 140 Kbps, and it also performed well in multimedia playback.

—Lance Ulanoff

old stereo CD player yet. The MultiSpin 3Xe's audio fidelity isn't up to the quality of home CD players. In audio frequency response, for example, the drive extended out to only 15 kHz in the high treble end of the range (± 3 dB). This is rather poor performance compared with stereo CD players, which easily reproduce the entire human hearing range from 20 Hz out to 20 kHz.

Even with these glitches, the NEC MultiSpin 3Xe is bound to attract a crowd. Its excellent handling of multimedia CD-ROMs and solid two-year warranty with toll-free phone

technical assistance should please most customers. On the street, the MultiSpin 3Xe should sell for about \$550 or less, about \$150 to \$200 more than the retail price of double-speed models. If you want to save a little more on a triple-speed drive, an identical, internal MultiSpin 3Xi is available for \$100 less than the external model. Meanwhile, NEC is also offering a redesigned portable version of the CD-ROM drive, called the MultiSpin 3Xp. Priced about \$150 lower than the other MultiSpins, the 3Xp has the same throughput but a slower access time, about 250 milliseconds.

NEW DESIGN

Besides introducing an overall increase in performance, NEC has revamped the design of the MultiSpin 3Xe. Gone is the awkward flip-down door that required two hands to insert a disk caddy. The new model now uses a rotating external door that stays open while you switch between disks.

NEC has also added one feature long overdue in CD-ROM players: the ability to play standard music CDs without using computer software. All you have to do is pop a disk of, say, some Beethoven piano sonatas into the drive and a front-panel LCD indicates the track number and play mode. To control playback,

there are standard stereo CD player controls (play/pause, stop/repeat, next track, and previous track) so you can play a music disk without software or a computer, for that matter. For private listening, there's also a mini headphone jack and a volume control up front.

Unfortunately, you probably won't want to throw away your

technical assistance should please most customers. On the street, the MultiSpin 3Xe should sell for about \$550 or less, about \$150 to \$200 more than the retail price of double-speed models. If you want to save a little more on a triple-speed drive, an identical, internal MultiSpin 3Xi is available for \$100 less than the external model. Meanwhile, NEC is also offering a redesigned portable version of the CD-ROM drive, called the MultiSpin 3Xp. Priced about \$150 lower than the other MultiSpins, the 3Xp has the same throughput but a slower access time, about 250 milliseconds.

The unit, 2.2 by 6.1 by 10.1 inches (HWD), is top-loading and comes with a switch-selectable SCSI 1/SCSI 2 interface. It weighs 2.4 pounds and is available either in beige or in a shade of gray that matches NEC's Versa series of notebook PCs.

Is the MultiSpin 3Xe going to be a long-lasting standard for CD-ROM drives? With NEC's quadruple-speed 600-Kbps drive on the way, probably not. But for now, this is a drive that can really make multimedia move. □

▶ FACT FILE

NEC MultiSpin 3Xe
NEC Technologies Inc., 1255 Michael Dr., Wood Dale, IL 60191; 800-388-8888, 708-860-9500; fax, 800-366-0476.

List price (estimated): \$600; 16-bit ISA SCSI controller kit, \$125; enhanced parallel-port kit, \$160.

Requires: 16-bit expansion slot for SCSI controller.

In short: NEC continues to raise the standard for CD-ROM drives with its triple-speed MultiSpin 3Xe, the first of its kind. In most tests, it far exceeds the performance of standard double-speed models, although it isn't as effective at simple text retrieval and its audio performance could use some improvement.

Integrated Software

Microsoft Works Lets You Bring the Office Home

BY GREGG KEIZER

Microsoft Works for Windows, Version 3.0, not only boasts more power than its closest competitor in the low-end integrated software market, it also demonstrates top-notch integration between tools and ups the ease-of-use ante.

Unlike Claris Corp.'s ClarisWorks for Windows, the \$199 Microsoft Works functions less as a compound-document creator than as a traditional set of productivity tools. Rather than showing a single document, as ClarisWorks tends to do, Microsoft Works relies on its four modules—word processor, spreadsheet, flat-file database, and new communications tool—to prepare numbers and words separately and then deposit them into a report.

OLE-ESQUE

This seemingly old-fashioned means of integration isn't restricted to dull cut-and-paste techniques, though. Using the same Microsoft OLE (Object Linking and Embedding) 2.0 functionality found in Microsoft Office's full-grown applications, you can drag and drop Microsoft Works elements between windows, and then double-click on the object to show the appropriate menu set for fast editing.

Other features ease the transition between Microsoft Works and Microsoft's more full-featured applications. Microsoft Works' toolbars are eminently

customizable, the three primary modules' menu bars are identical, and most dialog boxes feature a file-folder-tab metaphor that collects similar options in one place. There's also a set of

global Cue Cards that provide step-by-step help for frequently performed tasks. If you outgrow Microsoft Works—or use something like Microsoft Word or Microsoft Excel at the office—you can easily save your documents in any number of familiar application formats, including Word for Windows 2.0 and 6.0, Excel 4.0 and 5.0, and WordPerfect 5.x.

Version 3.0 not only represents an overhaul in formatting capabilities for Microsoft

Works' three main modules, but also the appropriation of some features from its high-end mates. The word processor now allows for multiple columns, automatic hyphenation, and text wrap around objects, making it an elementary layout system.

Other useful additions include the easy-to-use Footnote Wizard, a feature to insert named spreadsheet ranges as a table, and a one-stop dialog box to generate mailing labels and envelopes. Mail-merge, easy enough in Microsoft Works 2.0, is even more flexible here, whether you're using a Wizard to set up the merge database or culling information directly from a Microsoft Profit database.

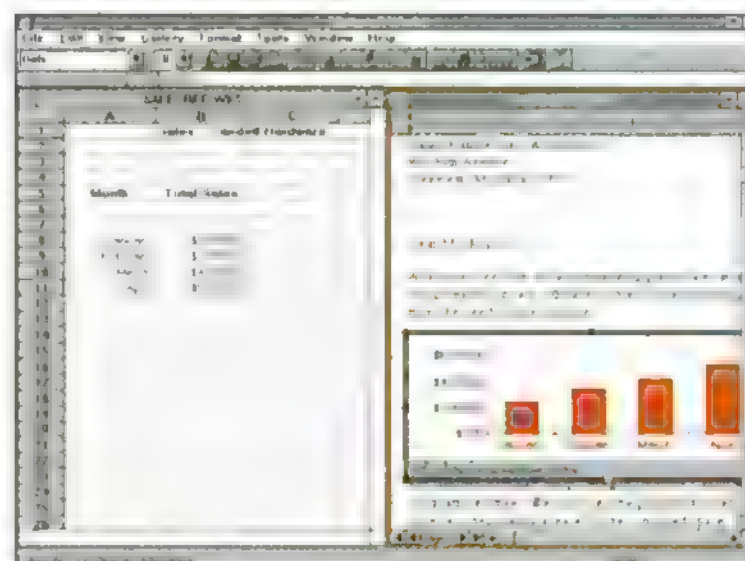
You won't mistake Microsoft Works' spreadsheets for

Excel 5.0's, but you now get multiple fonts, colors, and cell shading; automatic table formatting; and 3-D charts. Chart creation is especially snappy, letting you change the direction of the data series (down or across) with a single click. And with over 70 functions and an expansive 16,386-by-256-cell grid, this is an unusually strong tool for an integrated package.

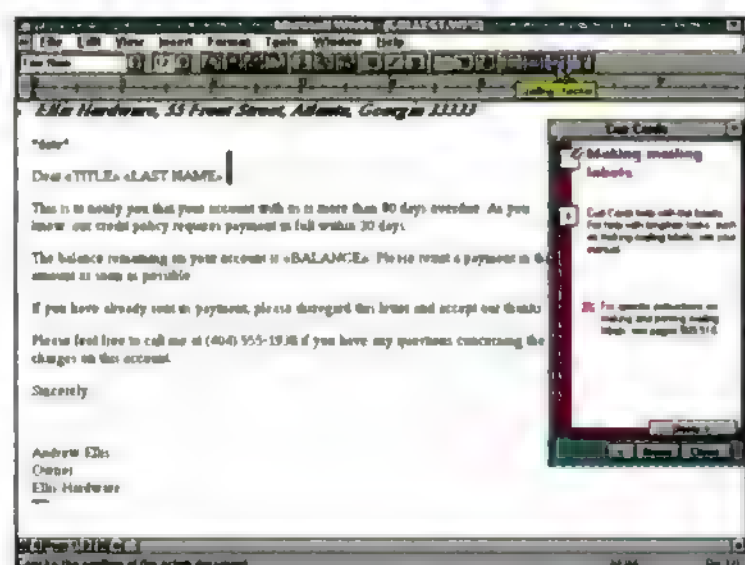
The database tool shows big formatting gains, too: You can still create a form layout by dragging fields on the screen, but now those fields can sport multiple fonts and colors. The enhanced query tool lets you assemble as many as three criteria through relatively plain-English parameters like "is greater than."

New in Microsoft Works 3.0 is the communications tool, a definite step up from the Windows applet used by earlier versions (and by ClarisWorks for Windows).

Works for Windows has plenty of power, but it is also simple to start and easy to use.



IT'S A DRAG: Microsoft Works' use of OLE 2.0 lets you drag and drop spreadsheet objects.



WORK GUIDE: Some forms of help in Microsoft Works: Cue Cards and toolbar labels.

FACT FILE

Microsoft Works for Windows, Version 3.0

Microsoft Corp., One Microsoft Way, Redmond, WA 98052; 800-426-9400, 206-882-8080

List price: \$199.

Requires: 4MB RAM, 4MB to 15MB hard disk space, Microsoft Windows 3.1.

In short: Microsoft Works for Windows 3.0 regains the lead in integrated software through the addition of a communications module, the incorporation of Microsoft OLE 2.0, and enhanced ease of use.

ON READER SERVICE CARD

Microsoft's often-heard claim of usability shows here, for the package hands you a 19-lesson tutorial and includes a dozen Wizards to step you through such troublesome tasks as building a contact database or creating a letterhead. Even better, 40 templates quickly create business and personal documents.

And unlike its full-fledged siblings, Microsoft Works is fast. On a 33-MHz 486 PC with 8MB of RAM, even the most demanding jobs—OLE 2.0 embedding, for example—are a snap. Less powerful notebooks, a natural habitat for Microsoft Works, still run the program quite well.

Version 3.0 of Microsoft Works for Windows may not take the sexy, document-centric approach of ClarisWorks, but it is ultimately simpler to start and stronger down the stretch. □

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CIRCLE 161 ON READER SERVICE CARD

■ Networking

LANtastic Retools With Simpler Version For Novices

BY STEVE RIGNEY

As network vendors bolster their peer-to-peer-based network operating systems with multiprotocol support, security, and electronic mail, end users are complaining that these traditionally simple operating systems are getting too hard to use.

Artisoft's Simply LANtastic, Version 5.0, is an attempt to make nonserver-based networking easy enough for even the most inexperienced users. Priced at \$149 for one network adapter/software combination, Simply LANtastic is a scaled-

down version of Artisoft's LANtastic, Version 5.0. A single-node, software-only version is available for \$79, and the two-node software-and-hardware Starter Kit costs \$299.

Simply LANtastic is an entry-level network operating system specifically designed for small-business and home use. It comes with both DOS and Windows software that lets you share printers, hard disks, and CD-ROM drives. Simply LANtastic uses the same core software as LANtastic 5.0, but it doesn't offer the same features and configuration options, such

as file-level security and network customization.

When you need to upgrade your network, it's easy because the Simply LANtastic client software will also attach to a LANtastic 5.0 server. This ability gives you access to other platforms, including NetWare. You can easily install a Simply LANtastic LAN and grow into a LANtastic 5.0 or even a NetWare environment.

EASIER INSTALLATION

You can install Simply LANtastic under either DOS or Microsoft Windows. The installation program scans your hard disk for a copy of Windows and determines what version of the network operating system to install. The installation program also provides directions for configuring your network. Every step of the installation process is explained, with examples.

Ease of use is the key to this operating system. Sharing data, printers, and CD-ROMs is as easy as clicking a mouse button. Once you tell the program the number of client PCs and the type of network adapter card you have, the software does the rest. Simply LANtastic also includes a basic e-mail program.

The operating system is designed with no frills in mind and supports only three types of security: full access, no access, and read-only access. Basic security options and file and printer sharing are the extent of control you have over the network.

Unlike LANtastic 5.0, Simply LANtastic won't let you configure the server for better performance, and it doesn't include Artisoft's LANcache network cache utility, but you can use other disk cache programs such as DOS's SmartDrive.

Simply LANtastic also includes a new LANtastic editor

FACT FILE

Simply LANtastic, Version 5.0

Artisoft Inc., 691 E. River Rd., Tucson AZ 85704; 800-846-9726, 602-670-7100; fax, 602-670-7101

List price: \$149 per node; software only, \$79; two-node Starter Kit, \$229.

Requires: 15K RAM (for workstation), DOS 3.1 or later or Windows 3.1.

In short: Simply LANtastic is a scaled-down version of LANtastic 5.0 designed for entry-level networks. It includes both DOS and Windows interfaces, as well as easy-to-install proprietary Ethernet network adapter cards

ON READER SERVICE CARD

(LED) that you can use when you want to edit your AUTOEXEC.BAT, CONFIG.SYS, and WIN.INI files.

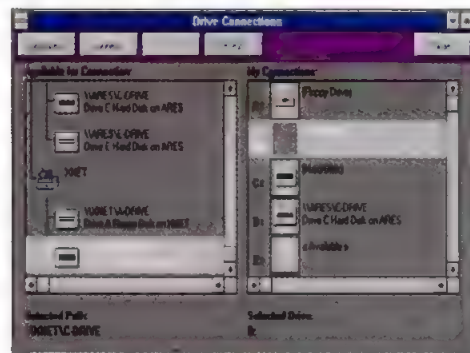
Ease of use and performance take precedence over corporate security and network customization in the design of this product. Unlike other entry-level peer-based network operating systems, such as Coactive Com-

■ The Card Makes the Network

A key reason for Simply LANtastic's low price is the new LANtastic network adapter card. Simply LANtastic addresses a specially designed Ethernet card that uses proprietary cable. These new cards are based on 10-megabit-per-second CSMA (Carrier Sense Multiple Access) Ethernet and contain the same ALICE (Artisoft's LAN Interface Chip for Ethernet) chip set found with Artisoft's NodeRunner line of Ethernet adapters. In fact, the new Simply LANtastic cards are identical to Artisoft's NodeRunners, with the exception of a different cable connector and transceiver.

That cable makes it easier to connect the network nodes. Unlike IEEE 802.3-compliant Ethernet adapters, the proprietary Simply LANtastic cards don't need terminating resistors at both ends and use very thin RG-145 cable and 1/8-inch RCA miniature phone-plug connectors. The cable length is limited to 200 feet, and you can't add more than 20 client PCs to the cable. Unlike 10BaseT or 10Base2, the Simply LANtastic adapter cards use a daisy-chain topology. Each adapter has two connectors, and adding a new client PC is as easy as plugging in a new cable.

The Simply LANtastic software also works with Artisoft's NodeRunner Ethernet adapters and with any third-party network adapters that support the Network Driver Interface Specification (NDIS). Artisoft is currently working on an external-parallel-port network adapter card that uses the RG-145 cable so you can connect notebook PCs to your Simply LANtastic network.—SR



HOOK UP: Use Simply LANtastic's interface to connect network drives and printers.

puting's Coactive Connector, Simply LANtastic offers the power of a 10-megabit-per-second Ethernet network at a fraction of the cost of other peer-based Ethernet LANs. If you need to share a printer, hard disk, or CD-ROM drive with four or five other users, Simply LANtastic is one of the most appealing and economical alternatives on the market. □



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CIRCLE 182 ON READER SERVICE CARD

The Senseware[™] Company

■ Image Editing

Aldus PhotoStyler: More than Retouched for Version 2.0

BY LUISA SIMONE

It's misleading to call Version 2.0 of Aldus PhotoStyler an upgrade. The revamped interface and new color-matching system make this \$795 image editing program look—and perform—like a new program.

Novice and advanced users alike will applaud the new toolbar and preview-laden dialog boxes that make PhotoStyler more accessible and efficient. Now, when you choose Function from the tool palette, a toolbar appears with relevant configuration options, such as the size and shape of retouching brushes or the amount of feathering on a selection area.

NEW TOOLS

Productivity enhancements include a Quick Command palette that stores frequently and recently used commands. A Multi-preview feature lets you compare settings for image correction and special effects filters by toggling between two "what if" scenarios.

Even more impressive are the Practice Pad and the Multi-transform dialog box, which let you experiment on a copy of your image. The Multi-transform function, for example, uses a low-resolution version of the current picture in order to provide quick responses to your rotation, skewing, perspective, and sizing changes. If you like the result you can apply the entire sequence of transformations to the current selection with a click of a button.

In response to the ever-increasing size of bitmapped images, PhotoStyler 2.0 can open files in a number of unique ways. You can, for example, open a screen-resolution copy of a file for experimentation purposes or load only a portion of a picture in order to conserve resources.

There are, however, limitations. The Multi-preview windows can show either the full picture or a cropped area at a 1-to-1 pixel ratio, but when you work with large, high-resolution files, you'll find that the previews are either zoomed out too far or zoomed in too close to be accurate visual guides. Likewise, there is no automatic way to

For example, the Soft Proof command converts RGB data into those colors that are achievable with your CYMK printer and then displays the results on screen. In our tests, a super-saturated hot pink (outside of the CYMK gamut) shifted toward blue and gray just as it would in the printing process.

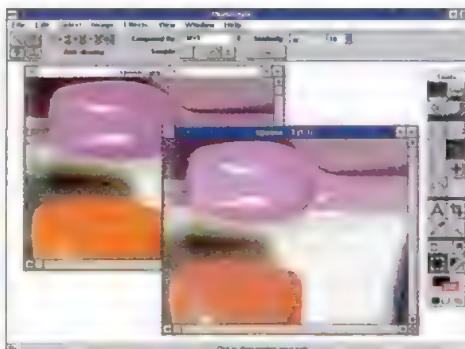
The Kodak Precision Color system ships with several generic profiles to compensate for the relatively small number of device-specific PTs. You can expect Kodak to develop—and charge for—new hardware profiles as well as software that will give end users the power to create customized profiles (for more information call Eastman

supports Object Linking and Embedding (OLE)—but it's the 1.0 specification (not the 2.0). And though you can now edit CYMK images, a few very important functions—like Color Balance—are still restricted to the RGB color space.

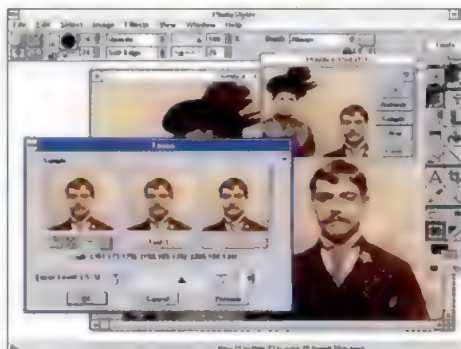
Some of the seemingly minor changes, however, will make a major difference in the daily life of end users. The rotation tool now includes a horizontal or vertical level that can straighten out crooked scans. And thanks to a feature called *continuous painting* you can now undo multiple brush strokes created with any brush. The ability to drag and drop irregularly shaped selection areas from one picture to another is a powerful and intuitive composing tool.

File support in Version 2.0 has been improved in two different ways. PhotoStyler can now handle a wider variety of formats, including TIFF, .DCS, JPEG, PhotoCD, Scitex, and .PSD—the native format of Adobe Photoshop for Windows. Files are also easier to find, because PhotoStyler bundles the ImagePals Album utility, a subset of the well-respected ImagePals cataloging, conversion, and screen capture program.

Aldus PhotoStyler, Version 2.0, refines the robust functions in Version 1.0. The new



KODAK MOMENT: The Kodak Precision Color system kicks in when you convert from one color model to another.



MULTI-PREVIEW: You can compare—and make valid judgments about—two different focus settings.

apply the changes you make on the preview to the original image.

KODAK BEHIND THE SCENES

There are also big changes behind the scenes. The Kodak Precision Color system supplies Profiles (called Precision Transforms or PTs) for specific input, output, and display devices. The program, which is fully integrated with PhotoStyler, can then calibrate and adjust colors based upon the capabilities of your scanner, printer, and monitor.

Kodak Co. at 800-752-6567).

Many of PhotoStyler's basic image-editing tools have been tweaked rather than overhauled. Instead of exporting a mask as a separate, 8-bit gray-scale image for editing purposes, you can now easily create transparency effects with PhotoStyler's normal painting tools and the new Ruby Mask layer.

In several cases, PhotoStyler's new features aren't as new or as powerful as they should be. The program now

interface makes it an accessible and productive image-editing tool today, and the incorporation of Kodak Precision Color gives it a head start on the image-editing functions of tomorrow.

• List price: Aldus PhotoStyler, Version 2.0, \$795; upgrade from Version 1.0, \$150. Requires: 6MB RAM, 80MB hard disk space, Microsoft Windows 3.1. Aldus Corp., 411 First Ave. South, Seattle, WA 98104; 206-622-5500; fax, 206-343-4240.

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CIRCLE 226 ON READER SERVICE CARD

Digitizing Tablets

Wacom's ArtZ Tablet Helps You Quit Mousing Around

BY LORI GRUNIN

Despite its ArtZ appellation and its excellent support for pressure-sensitive input, Wacom's \$499 serial digitizing tablet isn't just for the artsy. With a diminutive total footprint of 9.6 by 13 inches and an active tablet area of 6 by 8 inches, the ArtZ takes up slightly more desk space than a standard mouse pad and represents a fluid and intuitive (albeit relatively expensive) alternative to a mouse.

The ArtZ offers several enhancements over the SD-510C tablet it replaces. Wacom has dropped the external power supply box, substituting it with an AC adapter that plugs into the new 8-foot serial cable.

The tablet ships with the slim, lightweight, cordless Wacom UltraPen, which has a single button that can be programmed to emulate common mouse operations such as double-clicking or right-mouse-button clicks. The combination of long cable and lightweight pen makes working with the tablet on your lap convenient.

Users who found double-clicking frustrating on previous tablets will appreciate the addition of Double-click Assist in the new Windows driver: It lets you define a pixel radius within which the driver will sense a double-click. This feature almost singlehandedly makes the ArtZ usable under Windows.

Most important for artists, the ArtZ tablet supports up to 120 levels of pressure sensitivity, and the driver now lets you create custom pressure-response curves and stylus pressure levels. (Current tablet owners can download the driver from the Wacom BBS or order it from the company for \$40.)

The ArtZ worked very well when tested with a variety of

Windows applications, including Microsoft Word for Windows, Fractal Design Painter, and Quicken for Windows, as well as with most DOS applications. The Windows driver emulates a Microsoft mouse, and a separate driver performs mouse emulation in DOS.

One significant problem we encountered—frequently recurring crashes in Microsoft applications that yielded "Call to Undefined Dynalink" error messages—were eradicated by turn-

ing off support for the Windows Pen Computing API.

The tablet ships with an Autodesk ADI driver for use with applications such as AutoCAD and Animator Pro. It supports AutoCAD for Windows, although you must obtain the



SKETCHY: The ArtZ has a 6- by 8-inch active area.

WinTab API from Wacom.

We also managed to damage the stylus by accidentally dropping it on its point from a height of 3 feet, although the company claims it should not have broken quite so easily.

These difficulties aside, the ArtZ is a great deal for electronic artists, as well as an extremely functional alternative to mousing around.

• List price: *ArtZ Serial Tablet (UD-0608-R)*, \$499; 4-button cursor, \$150. Wacom Technology Corp., 501 S.E. Columbia Shores Blvd., #300, Vancouver, WA 98661; 800-922-6613, 206-750-8882; fax, 206-750-8924.

Circle 428 on reader service card

Communications

Pipeline: Enter the Internet

BY BARRY SIMON

You'll be hearing a lot about the Internet this year, but how do you log on to try it out? Windows users unfamiliar with the arcana of Unix now have a new on-line service/software combination that helps.

It's called The Pipeline, and subscriptions to the service are available via a variety of plans starting at \$12 per month and \$2 per hour through \$35 per month for unlimited connect time.

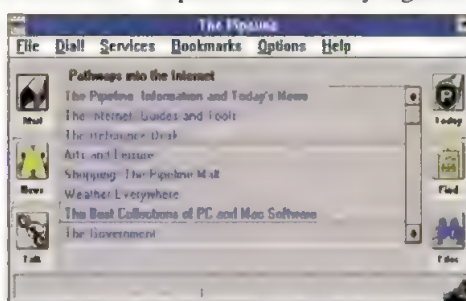
Access is via a New York City number, so long-distance charges may apply.

The software, Pipeline for Windows, provides special routes into each of the Internet's three main areas: discussion groups, file libraries, and free databases.

The software has a mail manager with folders, a Windows-based multiline editor, and an address book.

File handling is automated with FTP and Archie, a tool for

searching for files by name or keyword across hundreds of Internet nodes. Other services typically require you to transfer files from the foreign host and then do a separate download to your system. Pipeline automatically begins the



EASY ACCESS: The Pipeline main menu gives you a list of pathways into the Internet.

download to your PC as it receives the file via FTP, and it performs the download in the background.

Discussion groups on the Internet take two forms: Mailing Lists to which you subscribe and usenet News Groups that are similar to the forums you find on CompuServe. No special support is provided for Mailing Lists beyond the standard Unix tools, but there's a slick interface for setting up bins of News Groups.

The Internet organizes ac-

cess to remote data through a protocol called Gopher. Pipeline provides access to two popular search tools: Veronica and Jughead (although Jughead is buried in a submenu). Its point-and-click control makes browsing much easier than it is with tedious Unix text menus, and you get the wondrous ability to mark any resource you find with a bookmark so that you can get back to it quickly in the future.

While the software is robust, we found some limitations during testing. Some mail sent offline was lost, and the mail manager, while much better than the standard Unix mail program, is far from state of the art.

But Pipeline is such a quantum leap forward in Internet access that anyone interested in exploring the Internet should try it.

• List price: *The Pipeline/Pipeline for Windows, Version 1.2.2*, \$90; fee waived for users subscribing for three months or more. Monthly fees vary from \$12 per month plus \$2 per hour to \$35 per month for unlimited access. Requires: 1.5MB hard disk space, Microsoft Windows 3.1. The Pipeline, 150 Broadway, #1710, New York, NY 10038; 212-267-3636; modem log-ons: 212-267-7930 (2,400 bps), 212-267-9112 (9,600+ bps).

Circle 427 on reader service card

■ Full-Motion Video

ReelMagic Points to a Future of Fast, Full-Screen Film Clips

BY GREG PASTRICK

What a difference more frames per second make. We've all seen the choppy, pixelated, 15-frames-per-second (fps) playback of multimedia video files and film clips where the moving images never match the sound or fill the screen.

Video playback through Sigma Designs' forward-looking ReelMagic CD (\$499), a video controller board designed to process 30-fps film sequences adhering to the MPEG (Motion Picture Experts Group) standard, gives striking visual evidence of how much better full-motion video will be once applications embrace the MPEG standard. You won't find many today.

The integration of 16-bit digital sound processing, a CD-ROM interface, and CD-audio connectors on the full-length, 16-bit board make it a slot-saving add-in that will turn your PC into a complete multimedia system with one installation.

Sigma Designs offers a CD-ROM upgrade package (\$849) that puts a dual-speed MPC-2 Sony CD-ROM drive, two speakers, and five CD-ROM disk titles in a single kit with the ReelMagic board.

THREE-CHIP OFFENSIVE

The MPEG audio and video compression/decompression control and coordination of video effects come from a trio of Sigma Design chips. The first is based on reworked C-Cube microcode and is the primary link to MPEG-standard applications. The high compression ratios for MPEG sound and video files allow up to 72 minutes of full-motion

sequences to be pressed onto CD-ROM disks. Without chip sets like these, software playback of .MPG files is decidedly slower and less efficient. The remaining two custom Sigma Designs chips coordinate compression and decompression of the files and manage the video effects.

The ReelMagic board's 8- and 16-bit sound, at sampling rates of up to 44.1 KHz, is processed by an Analog Devices ADSP-2105 sound chip mounted on-board. The AdLib/Sound Blaster-compatible analog-to-digital sound processing is supplemented with an OPL-2 FM synthesis daugh-

tercard onto your system's existing VGA or Super VGA card through a ribbon cable running from the ReelMagic board to the feature connector on the installed video card. Unless your existing video card has an active feature connector, there's no way that ReelMagic can process video input. A call to your video card manufacturer will confirm its status.

An active feature connector isn't the final check, though. We used the ReelMagic card with the standard Compaq video adapter on our test-bed Compaq Deskpro without problems, but

access to 32,786 colors in any video mode at screen resolutions of up to 1,024-by-768. It's not a fault in the card but the simple, inescapable hardware limitation of the standard, 8-bit-bus video-card feature connector.

While the card gives you a CD-ROM interface and CD audio connectors on the inside of your system, its only external connections are the audio-out/headphone line and a 9-pin video connector. Physical setup of ReelMagic requires direct connection of the system display to the Sigma Designs card, with placement of a termination plug on the 9-pin adapter of your existing video card.

LIMITED APPS

With drivers loaded, software installed, and the CD spinning, the only limit to enjoying the benefits of ReelMagic's true, full-motion, laserdisk-on-a-CD video capabilities is the availability of applications with MPEG video sequences. Sigma Designs has been working with developers such as Aris Entertainment, Access Softtek, Activision, Compton's NewMedia, and ReadySoft on multimedia titles that will support the ReelMagic controller. Sigma Designs provides a DOS application programming interface, along with development tools and support for Windows MCI and OLE 2.0 standards for ReelMagic-compatible products.

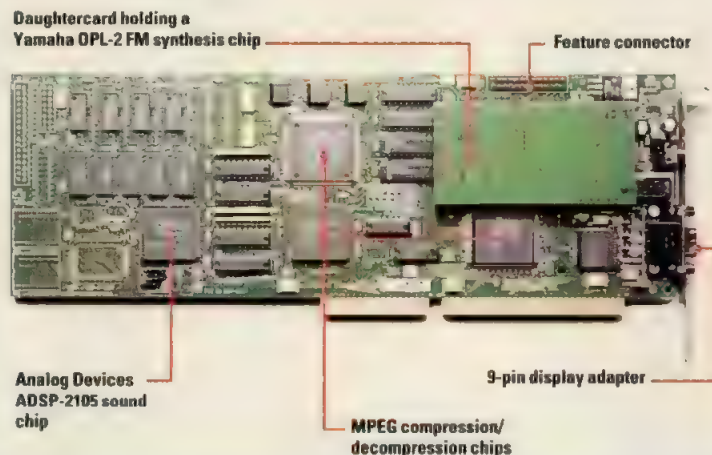
The board is now bundled with the arcade-game clone *Dragon's Lair*. The upgrade kit will come with Compton's Interactive Encyclopedia, a list of Aris titles, as well as *Return to Zork*.

• List price: \$449; upgrade kit (including dual-speed MPC-2 CD-ROM drive, speakers, and software), \$849. Sigma Designs Inc., 47900 Bayside Pkwy., Fremont, CA 94538; 800-845-8086, 510-770-0100; fax, 510-770-2640.

Circle 423 on reader service card

Anatomy of the ReelMagic CD

The ReelMagic CD board is built with a trio of Sigma Designs MPEG controller chips that manage video-sequence compression/decompression, as well as windowed and full-screen film effects. Sound is processed by an Analog Devices ADSP-2105 sound chip mounted on-board, with OPL-2 FM synthesis handled by a Yamaha YM3812-F chip mounted on a daughtercard.



tercard holding a Yamaha YM3812-F chip. The sound and synthesized voices handled by these chips give full CD-quality stereo audio output that's supported by basic mixing controls.

CHECK COMPATIBILITY

The card itself plugs into any free 16-bit slot and piggybacks

Sigma Designs acknowledged incompatibilities with some ATI, Diamond, and Orchid video cards. It's worth a prepurchase call to Sigma Designs to check compatibility with your video card, just to be sure.

You also need to know that ReelMagic won't work with 24-bit color, though you do have

PCs

Compaq's Deskpro XE: Midrange for Mainstream Apps

BY BRUCE BROWN

Compaq Computer Corp.'s new midrange Deskpro XE line combines upgraded graphics from the Prolinea line, better-than-average system performance, effective audio utilities, and Energy Star compliance. With features, performance, and pricing that all fall between those of the Prolinea value line and the high-performing Deskpro/M systems, the Deskpro XE family is a sensible compromise for mainstream users.

Deskpro XEs are available with 486SX/33, 486SX/50, 486DX2/66, and 60-MHz Pentium processors. The unit we looked at, a 486DX2/66 model with 16MB of RAM, 256K external RAM cache, and a 340MB hard disk, is suitably equipped for mainstream business users. As configured, with standard software and a 3.5-inch floppy disk drive, the Deskpro XE 1466 should sell for about \$2,799 without a monitor. Basic models have 8MB of RAM and no external RAM cache.

SMALL FOOTPRINT

The Deskpro XE's small-footprint 4- by 15.9- by 15.1-inch case has limited expandability. The only extra drive bay is an externally accessible 5.25-inch bay for a 5.25-inch floppy disk, tape, or CD-ROM drive. Expansion-card accommodation is also limited, with just three 16-bit ISA-card slots. The 486 models can take one half-length expansion card and two full-length cards, while the Pentium model can fit three full-length cards. None of the expansion slots have local-bus exten-

sions. Four SIMM sockets permit up to 32 of RAM on the 486 models. The Pentium version has a maximum 136MB of RAM capacity.

All Deskpro XE models have Compaq's enhanced QVision local-bus graphics integrated on the motherboard. Compaq didn't provide an 800-by-600-pixel resolution with 256-color Windows driver for this video setup, so we completed performance testing with a Microsoft 800-by-600 16-color driver. The disappointing Graphics WinMark score is likely to improve significantly with Compaq's own driver.

On all performance tests other than the Graphics WinMark, the Deskpro XE 450 proved itself by scoring above average when compared with 486DX2/66 systems previously tested by PC Labs.

The Deskpro XE Pentium model lacks Energy Star compliance, but the 486 models meet the 30-watt-or-less Energy Star power consumption level for both the computer and an attached Energy Star-compliant monitor. An easy-to-use Power Management software utility is standard but works only if you have an Energy Star-compliant

monitor attached, even for setting the system time delay.

Compaq has upgraded its Business Audio features on the Deskpro XE line, including compatibility with the Microsoft Windows Sound System and



SLIM: The XE is Energy Star-compliant.

15:1 ratio TruSpeech audio compression. An included microphone either attaches to the side of your monitor or fits in a stand.

Microsoft's Voice Pilot lets you train standard and custom commands to your own voice so that you can use simple commands to trigger keyboard macros.

Along with DOS 6.2 and Windows 3.1, Compaq's Tab-

Works is included with the Deskpro XE models. Developed by Xerox Corp.'s XSoft division, TabWorks uses a tabbed notebook metaphor for organizing and executing program, document, and utility icons. TabWorks is an intuitive program with a conventional top-line menu, left-side-of-the-screen icon-based ButtonStrip, tabs for different notebook pages, and a bottom-screen status bar. It simplifies Windows operations, though you pay a slight price for having yet another graphics application running.

Since the Deskpro XE also comes with the Compaq Welcome Center, Deskpro users will find themselves with three graphical user environments: Windows, TabWorks, and the Welcome Center.

With only modest expansion capabilities and a lack of local bus slots, the Compaq Deskpro XE line can offer only average per-

formance compared with Compaq's high-end PC lines, but the XE family is a success for Compaq because it meets the company's goal of supplying a midrange system with good performance. The Deskpro XE's fine design, Business Audio, and Energy Star compliance make it a great system for general business. Compaq's three-year warranty and on-site service are big advantages too.

• List price: *Compaq Deskpro XE 466 with 486DX2/66 processor, 16MB RAM, 256K external RAM cache, 340MB hard disk, DOS 6.2, Microsoft Windows 3.1, Compaq TabWorks, Windows Sound with Voice Pilot, \$2,799. Compaq Computer Corp., P.O. Box 692000, Houston, TX 77269; 800-345-1518, 713-370-0670.*

Circle 431 on reader service card

Benchmark Tests: Compaq Deskpro XE

Except for its Graphics WinMark and Winstone scores, the Compaq Deskpro/XE did better than the average of the 66-MHz systems we tested. Because Compaq did not provide a 800-by-600, 256-color video driver, we used a Microsoft Windows driver for testing. With Compaq's own driver, the Graphics WinMark score should be higher.

We used PC Magazine Labs' PC Bench 3.0, WinBench 4.0, and Winstone 94, Version 1.0, to test the Deskpro XE's performance.

	PC Bench 3.0				WinBench 4.0		Winstone (score)
	Processor (score)	Video (score)	Disk (score)	DOSmark (score)	Graphics WinMark (millions of pixels per second)	Disk WinMark (score)	
Compaq Deskpro XE	40.0	3,589	1,276	649.1	5.5	985	48.9
486DX2/66 average	39.7	3,359	1,049	592.7	9.5	861	49.7

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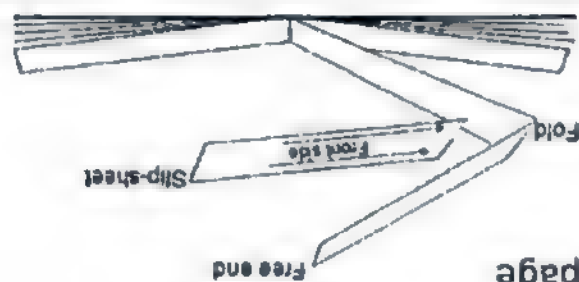
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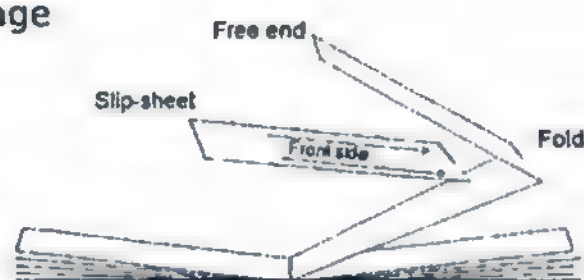


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Folded edge of the page

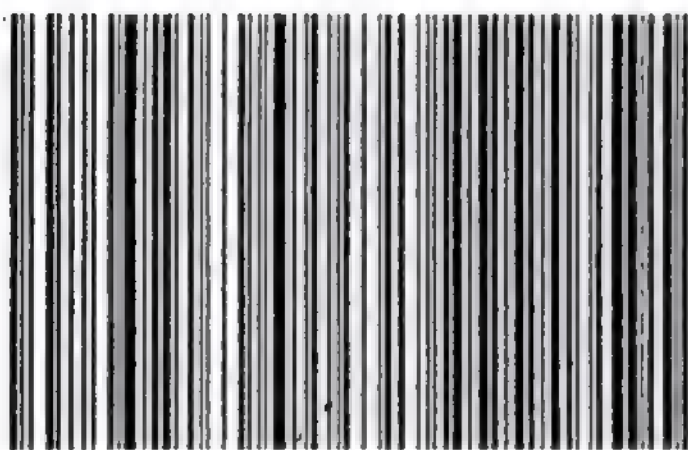
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- Microsoft DOS 6.2 with Tools, Windows for Workgroups 3.11 & Microsoft Mouse

- **486SX-25**
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- DOS, Windows, Mouse

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486
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PACKAGE #3:

- 8MB RAM
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- SVGA color monitor
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- DOS, Windows, Mouse
- Choice of Windows application

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486
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PACKAGE #3:

- 8MB RAM
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486
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- Choice of Windows application

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486
DX2-66

PACKAGE #4:

- 16MB RAM
- 528MB local bus hard drive with built-in 256K cache
- Windows-accelerated local bus video
- SVGA color monitor
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- DOS, Windows, Mouse
- Choice of Windows application

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486
DX2-66

PACKAGE #4 PLUS:

- 16MB RAM
- 528MB local bus hard drive with built-in 256K cache
- Diamond Viper local bus video card
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MM-PCM-9402A

Diagnostic Utilities

New Windows CheckIt PRO Compares Your PC to Others

BY SHERYL CANTER

TouchStone Software Corp., publisher of the well-known CheckIt line of diagnostic programs, has released its first Microsoft Windows program—CheckIt PRO: Analyst (\$149.95). Though Analyst shares many of the capabilities of the DOS-based CheckIt products, its special strength is in managing and comparing information from multiple systems.

Analyst also has a number of unique features, including The Software Shopper, which lists over 1,800 popular software packages and their system requirements and compares the requirements to what's available

in your system. The Setup Advisor provides similar information for hardware add-ons. There's also a Rate Performance facility that graphically compares your system with ten others, a System File Editor, and a variety of informational displays covering all aspects of personal computer systems.

DATA COLLECTION

Unlike other CheckIt versions, Analyst has a data collection component that is a separate program; Analyst itself simply displays and manipulates the data you collect. There are two versions of the data collection applet: one for DOS and one for Windows. The Windows applet is installed when you install Analyst and can also be launched from within Analyst. The DOS version, CKDATA, can be run from DOS, Windows, or OS/2. In addition to hardware and performance information, CKDATA

collects information about your DOS, Windows, or OS/2 setup.

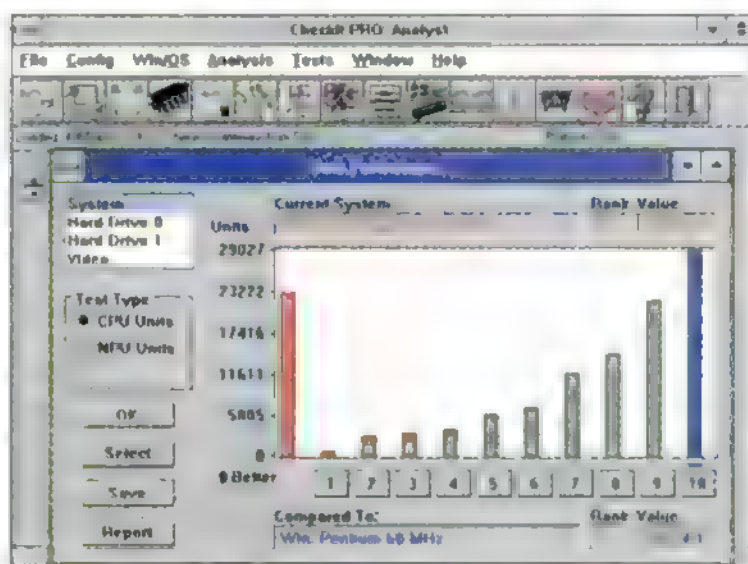
Our testing found the information gathered under DOS to reflect our system configuration accurately, but when run under Windows, Analyst reported the COM ports incorrectly. Under

son facility for detecting differences between .CKD files. Support technicians can run CKDATA when a machine is first assigned to a user. Then if there's a problem, the user can run CKDATA again and send the file to the technician, who runs a comparison between the current and original files.

Since the .CKD file also contains performance information, it's also interesting to run CKDATA on the same system from within different operating environments and compare the results.

If you need to tweak your system setup, Analyst's System File Editor will let you make changes to AUTOEXEC.BAT, CONFIG.SYS, WIN.INI,

or SYSTEM.INI. When editing WIN.INI or SYSTEM.INI, you can choose the section you would like to view from the



SPEED CHECK: CheckIt PRO: Analyst's Rate Performance feature graphically compares your PC's performance with that of others.

OS/2, much of the hardware information was incorrect—inaccurate hard disk, keyboard, COM port, memory, and IRQ information. TouchStone is working to fix the problems.

The data collection program produces .CKD files that can be read only within Analyst. End users with system problems can run CKDATA and then send the .CKD files to a support technician, who can load the data into Analyst to determine the source of the problem.

Analyst uses the .CKD files to display system information, and the program also offers some rudimentary testing facilities. Like CKDATA, the testing programs are applets that you can run from within Analyst, or that you can launch from the DOS command line. But when you run them from Analyst, you can't access the applets' options.

One of the most useful features of Analyst is its compari-

Section menu, and the cursor will instantly be moved to that section—a welcome convenience.

DATABASES GALORE

Analyst includes several useful databases. The Setup Advisor contains a list of over 100 hardware add-ons and their requirements specifying IRQ assignment, DMA channel, and I/O port address. If you click on the Analyze button, the Setup Advisor will tell you whether you have the resources necessary to install the hardware and will also make a recommendation about which settings to use.

The Software Shopper's product list runs along the left side of a dialog box, while an information sheet describing the system requirements of the highlighted package fills the rest of the window. Clicking on a button marked Vendor in the lower-right corner displays expanded information about the product, including the product category, suggested retail price, company name, and phone number.

Analyst's Reference Library is an on-line collection of reference materials, mostly geared toward how to service your computer. Much of the information is too shallow to be of real use, but some of it is handy and hard to find in other places.

A Rate Performance screen compares your system with up to ten others in terms of system, hard disk, and video performance. Click on the Select button to change the computers with which your machine is compared. There are 25 systems to choose from—everything from an 8088 to a Pentium.

By separating the data collection from the data manipulation, CheckIt PRO: Analyst sidesteps the instability problems that plague many Windows-based diagnostic programs. Analyst was designed with system administrators and support technicians in mind, but it's a terrific tool for anyone who wants to gain a better grasp of his or her system. □

FACT FILE

CheckIt PRO: Analyst
 TouchStone Software Corp.,
 2130 Main St., #250,
 Huntington Beach, CA 92648;
 800-531-0450, 714-969-7746;
 fax, 714-960-1886

List price: \$149.95; upgrade from CheckIt PRO, \$39.95; upgrade from CheckIt 3.0, \$59.95
Requires: 512K RAM, 3.2MB hard disk space, Microsoft Windows 3.1
In short: The Windows-based CheckIt PRO: Analyst provides extensive information about a computer's configuration and performance, and adds the especially handy capability of comparing different systems or the same system before and after changes

419 ON READER SERVICE CARD



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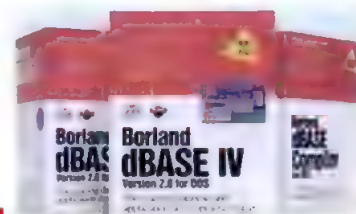
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¹ Usability Science Corporation, dBASE IV v2.0 vs. FoxPro v2.5, June 1993. ² dBASE IV for UNIX sold separately. ³ dBASE Compiler for DOS sold separately. ⁴ See special offer in dBASE Compiler box or call 1-800-538-3373, ext. 248. Prices good in the United States and Canada only. All prices are in U.S. dollars. Dealer prices may vary. Copyright © 1993 Borland International, Inc. All rights reserved. All Borland product names are trademarks of Borland International, Inc. B1 6429

PC

DECpc XL Series: Three Platforms In One System

BY TIN ALBANO

With all the talk about Reduced Instruction Set Computer (RISC) technology bringing workstation power to the desktop (see the First Look review of the IBM RISC System/6000 in this issue), high-end PC buyers are beginning to face some tough buying decisions. Which platform is the right one? 486? Pentium? RISC?

Digital Equipment Corp.'s latest line of high-end personal computers, the DECpc XL Series, tackles this problem head on by being very upgradable. In fact, Digital is going so far as to bill it as "the most upgradable PC on the planet."

That hype has some basis in fact. The DECpc XL family can be upgraded through three different processor classes. Systems can start out with Intel 33-MHz 486 processors, get upgraded to 60- or 66-MHz Pentium processors, and eventually (perhaps by June) will even be able to take advantage of Digital's own Alpha AXP RISC chip.

That kind of flexibility is attractive for buyers who want to hedge their bets, for while the Pentium processor has many RISC characteristics, it keeps the register structure of the 80x86 series of processors instead of using the large register files of true RISC chips. That leads to performance differences.

IMPRESSIVE DESIGN

We looked at a \$3,999 60-MHz Pentium-based DECpc XL 560 and found its engineering and design impressive. All the models

in the family are well-equipped enough to satisfy even the most power-hungry appetites. A DECpc XL 433DX outfitted with a 486/33 chip costs \$2,899. Also available are the \$3,299 DECpc XL 466d2 and the \$4,599 DECpc XL 566. Monitors are not included in these prices.

There is only one case design: a 17-by-7-by-17-inch (HWD) minitower that's the direct descendant of the DECpc MTE family. The system has a PCI/ISA-based motherboard, a ZIF processor socket, two buffered serial ports, an external SCSI-2 port, and a 300-watt 3.3V ready power supply. Along with one internal and four front-accessible storage bays, there are three available ISA slots, two PCI slots, and one PCI/ISA slot. All the CPU logic is placed on a daughtercard to make upgrading as easy as possible.

Also inside are two variable-speed fans that can sense exces-

sive heat and activate themselves automatically. One of the fans sends air directly along the CPU daughtercard.

To speed performance, Digital has implemented a 128K external writeback cache directly on its 486 daughtercards. That cache wasn't available on the Pentium-based unit we tested, but it's expected soon.

STRONG PERFORMANCE

The DECpc 560 we tested came with 8MB of 70-ns RAM (expandable to 192MB), a 340MB SCSI hard disk (525MB

couple of cases, very good. Using the PCI-based local-bus video card to its best advantage, the DECpc turned in excellent DOS Video and Graphics WinMark scores (3,744.4 and 19.3, respectively). The Diamond Viper PCI video subsystem is available as an option for those who need even better video performance than the S3 chip can offer.

PAST PENTIUM

Digital isn't alone in looking past the Pentium for the future. Because of the promise of

Windows NT, a number of computer chip manufacturers, not just IBM, are beginning to develop RISC-based processors that will take advantage of the NT operating system on PCI/ISA-based computer architectures (see "Pentium: The Second Wave," January 25, 1993).

1994 promises to be a year in which the characteristics of what makes a great high-end PC change and then change again.

No matter what happens with the ultimate success of NT and RISC processors, Digital's DECpc XL Series is well positioned to meet the needs of high-end PC shoppers, whichever way they intend to go in the future.

• List price: DECpc XL 433dx, \$2,899; DECpc XL 466d2, \$3,299; DECpc XL 560, \$3,999; DECpc XL 566, \$4,599 (prices include 8MB RAM, 340MB SCSI hard disk, 1.44MB 3.5-inch floppy disk, S3-928PCI local-bus video, 1MB VRAM, dual-speed SCSI CD-ROM, Microsoft Windows 3.1, DOS 6.0, and a mouse). Digital Equipment Corp., Maynard, MA 01754; 800-722-9332, 508-493-5111.

Circle 433 on reader service card

MINITOWER: The DECpc XL packs a lot of upgradability into a relatively small package.



and 1GB options), a 1.44MB 3.5-inch floppy disk, S3-928PCI-based local-bus video with 1MB of VRAM, and a double-speed SCSI CD-ROM drive.

The system's overall results on our entire suite of tests are good when compared with the historical average of all Pentium PCs we've evaluated, and in a

Benchmark Tests: DECpc XL

Though its performance was slightly below the average on our processor test, the DECpc XL video performance was excellent. We used PC Magazine Labs' PC Bench 8.0, WinBench 4.0, and Winstone 94, Version 1.0, to test the DECpc XL's performance.

	PC Bench 8.0				WinBench 4.0		Winstone
	Processor (score)	Video (score)	Disk (score)	DOSmark (score)	Graphics WinMark (millions of pixels per second)	Disk WinMark (score)	
DECpc XL	88.4	3,744	1,447	960.0	19.3	1,220	70.2
Pentium/60 average	70.8	1,981	1,400	778.6	15.4	1,240	75.6

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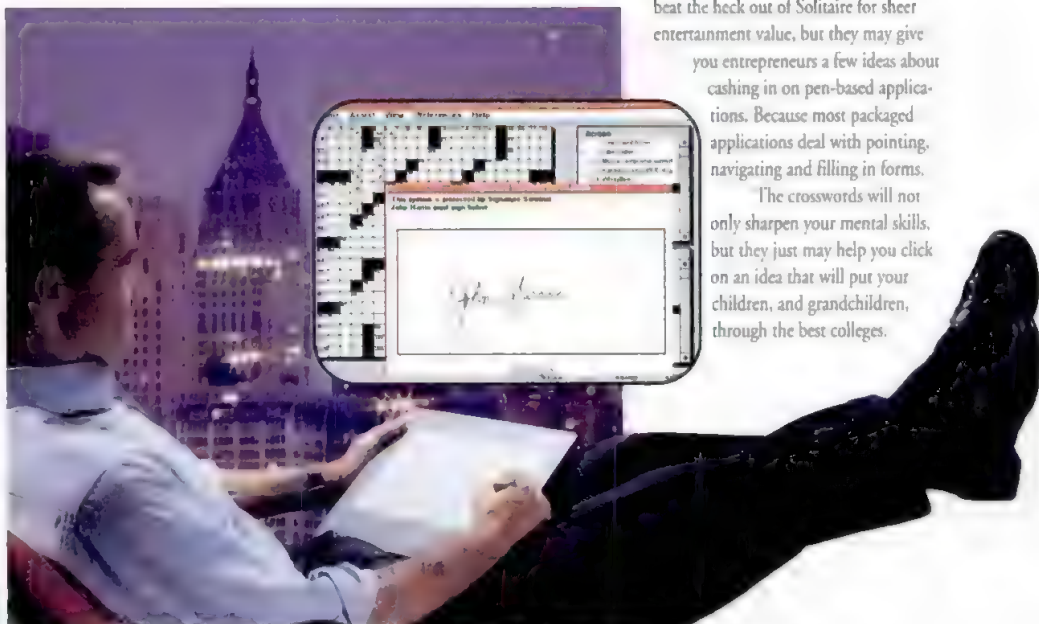
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subscribe to more). Not only will they beat the heck out of Solitaire for sheer entertainment value, but they may give you entrepreneurs a few ideas about cashing in on pen-based applications. Because most packaged applications deal with pointing, navigating and filling in forms.

The crosswords will not only sharpen your mental skills, but they just may help you click on an idea that will put your children, and grandchildren, through the best colleges.

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Why try to remember all those different passwords — and changing them periodically — when Handwriter for Windows comes with signature-verification security built into a screen saver? People may *try* to trace your signature, but it's virtually impossible to duplicate the stroke velocities you used to create it.

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Are you tired of hurting, of sitting for extended periods in a rigid, cramped position? 56% of all OSHA reported injuries are RSI, or Repetitive Stress Injuries. Wouldn't you rather sit comfortably in front of your computer, with a super-thin, 6-ounce pad on your knee? You'll be amazed how much more work you can do ... when you don't hurt. Because using Handwriter in concert with your keyboard allows you to stretch, move and easily change positions ... while you work. Now, you're probably thinking ...

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We could *tell* you about all the business opportunities in pen computing. But we'd rather *show* you, with an interesting game.

With each Handwriter for Windows, we'll be shipping 30 world-class crossword puzzles (and a way to

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Handwriter for Windows includes an ultra-thin/ultra-light tablet, cordless pen and a ten-foot connector to your serial interface. And along with our number-one ranked recognition software comes 30 crossword puzzles and our no-nonsense return privilege.

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■ Antivirus

Stop that Floppy! Disknet Blocks Viruses at the Door

BY NEIL J. RUBENKING

Most antivirus products *react* to a virus attack, blowing the whistle on virus behavior or shrieking that a program file is infected. Disknet, Version 2.15, (\$95 from Reflex) takes a unique approach: Its goal is to prevent viruses from ever reaching the PC. Reflex quotes a United States Air Force study that says 90 percent of all viruses are transmitted via floppy disks. With Disknet installed, a PC simply cannot access any floppy disk that hasn't been thoroughly tested and certified as virus-free.

VIRUS PATROL

After ensuring that all company PCs are free of viruses, you install most of them as Disknet clients, and one or more as Disknet administrators. Every PC within the Disknet "security shield" will reject any floppy disk that hasn't been approved by an administrator. The administrator's software validates a floppy disk by scanning it for viruses and, if none are found, stamping it with a signature based on its contents. Disknet comes with a copy of the well-

regarded F-PROT scanner, but Reflex recommends using at least two different scanners. When a client PC writes to the floppy disk, Disknet automatically updates the signature, but if an unsecured PC writes to the floppy disk, it must be approved again.

INVISIBLE TO USERS

Only the administrator needs to operate and maintain virus scanners. Most end users aren't burdened with the responsibility for using antivirus software correctly. Also, since the administrator must approve all floppy disks introduced into the company's systems, end users can't load games, pirated programs, or other unauthorized software.

If you install Disknet's optional CHECKDAT utility, client PCs can certify data-only floppy disks without going to the administrator. The LOCK utility locks Disknet into a PC, preventing crafty employees from disabling it. The C:CURE utility watches for boot-sector viruses, prevents hard disk access after booting from a floppy disk, and provides optional password protection for the PC. It's still con-

ceivable that an infected program might slip into the system, so Disknet's Program Security Guard prevents any modifications to selected executable files, even by sophisticated "tunneling" viruses.

A one-PC office might use Disknet to force scanning of all incoming floppy disks, but the product's real value is for companies with dozens or hundreds of PCs. By centralizing the responsibility for virus checking, it

makes system security manageable. And by keeping viruses out of PCs within the security shield, Disknet saves the considerable costs of recovery from a virus attack.

• List price: *Disknet, Version 2.15*, \$95; *multiuser licenses available*. Requires: 4K RAM, DOS 3.0 or later, Windows 3.x. Reflex Inc., 24120 Brier Rd., Brier, WA 98036; 800-673-3539, 206-487-2798; fax, 206-486-5139. Circle 420 on reader service card

■ Spreadsheets

Spreadsheet Connector: A \$5,000 Consolidator

BY CRAIG STINSON

The TM/1 Spreadsheet Connector calls itself a "client/server analytical database engine," and that just about says it all. Release 3.0 of this \$4,995 multi-user product occupies the middle ground between database programs and traditional spreadsheets. With Connector, your spreadsheet program—Microsoft Excel 4.0, Lotus 1-2-3 (for Windows or DOS), or Sinper Corp.'s own TM/1—serves as an analytical front end to data tables that reside on a dedicated "table server." These tables may store data in up to 16 dimensions. In your spreadsheet, you can browse through the tables and select any two-dimensional slice.

The system requires a network using NetBIOS or IPX (Internet Packet Exchange), as well as a dedicated computer to act as a table server. To keep the performance reasonably spreadsheetlike, all tables reside in the server's RAM or virtual memory. You'll also need a knowledgeable administrator.

Clients connect to the table server by means of add-ins attached to their host spreadsheets. For Excel and 1-2-3 for Windows, the add-in is a special "client edition" of TM/1 Perspectives, a product available separately from Sinper. Re-

gardless of which spreadsheet you use as a front end, you can log on to the server to get table slices, then use your spreadsheet's functions and charting services for further analysis.

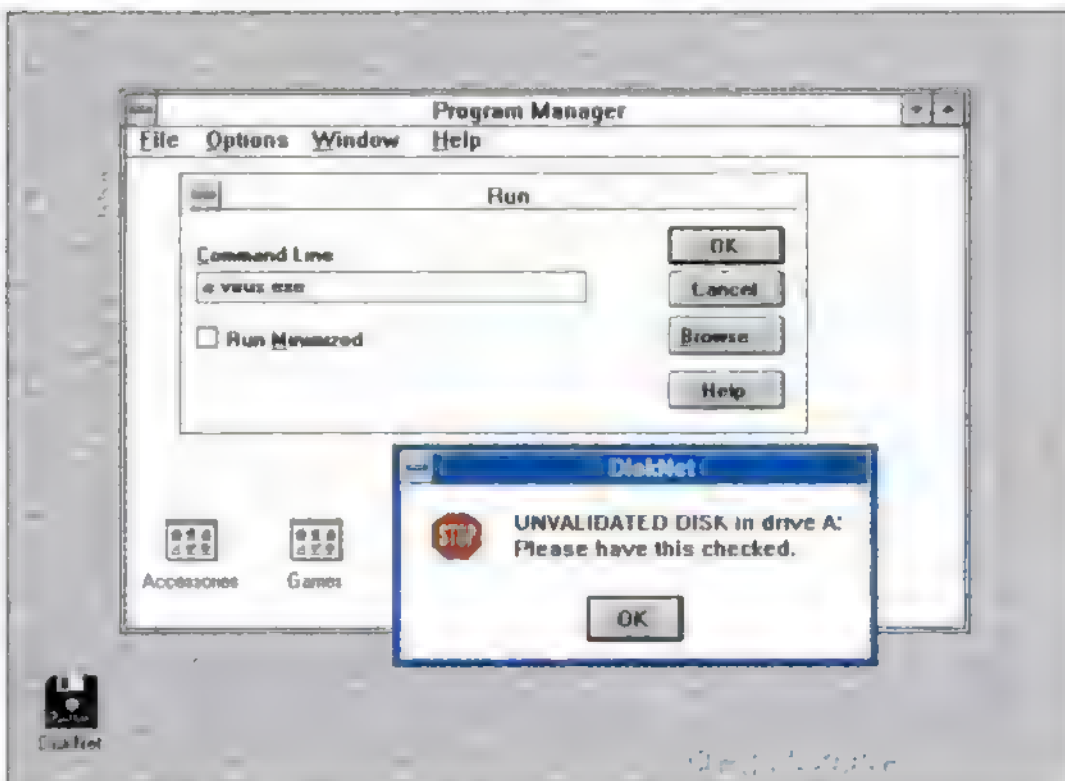
DATA INTEGRITY

Smooth integration with established spreadsheet programs is one of Connector's strong appeals. Its principal strength, however, is data integrity. The centralized approach to multidimensional modeling ensures that all users always work with the same numbers.

Connector is neither cheap nor (for the administrator) particularly easy to use. But if desktop multidimensional modeling tools such as CA-Compete! and Lotus Improv are underpowered for your critical applications, it's a solution worth investigating.

• List price: \$4,995 (includes server software, administrator and client versions of TM/1 Perspectives, and five-user license). Requires: For server: dedicated 80386-based PC or better with 4MB RAM; for client: Microsoft Excel 4.0, Lotus 1-2-3 for Windows or DOS, or TM/1 Relational Spreadsheet. Sinper Corp., 31 Mountain Blvd., Bldg. N, Warren, NJ 07059; 800-822-1596, 908-755-9880; fax, 908-755-9230.

Circle 425 on reader service card



STOP! A PC running Disknet refuses to access any floppy disk that has not been certified as virus-free.

Pixels per second

1,600,000

1,400,000

1,200,000

1,000,000

800,000

600,000

400,000

200,000

Close-Up 5.0

WinBench™ 3.11 by Ziff-Davis Labs Tests Remote Windows™ Speed

This graph shows the speed of the three leading remote control programs when transferring Windows screens. As you can see, Close-Up handles more pixels, faster, meaning you spend less time waiting for Windows screens.

The industry standard test, WinBench 3.11, is perfect for testing the speed of remotes. It is an accurate measure of video throughput. Video throughput is the limiting factor in remote operations, because remote programs must transmit Windows video functions from one PC to the other.

Communicate Faster & Easier

Close-Up lets you communicate faster & easier with five exciting technology firsts.

Close-Up is the only remote communications software that won both PC Magazine's coveted "Editors Choice" and PC World's "Best Buy" awards. Now Close-Up has a new faster & easier version that allows you to view and control another PC by modem as if you were there!

Technology Firsts

1. AI Video Compression
2. Photographic Memory
3. Non-Intrusive Technology
4. Expert System
5. Video Translation

Why Is Close-Up So Fast?

Close-Up learns as it works. It uses AI (Artificial Intelligence) to compress all Windows video function calls. That's why Close-Up does so well in Windows

Benchmark tests (see WinBench 3.11 chart).

Close-Up uses its revolutionary Photographic Memory™ so that once Close-Up has seen all or part of

a Windows screen, it's memorized. Then as screens change, Close-Up only transmits new unmemorized data. Incredibly, with this technology Close-Up gets faster & faster the longer you use it.

What Remote Companies Haven't Told You

Other remote programs permanently slow Windows and usually reduce your video resolution and depth of color, even when they are not in memory. That's because they permanently change your system.ini file. Close-Up's breakthrough Non-Intrusive Technology does not modify any of your sensitive Windows files including the system.ini. Close-Up is the only remote that when not in use, allows Windows and your PC to run at normal optimal levels.



Expert System Makes Communications Easy

You don't have to be a communications expert to get the results of one. Close-Up has an Expert System that automatically analyzes system components and configures your system for optimal speed.

Video Translation

With Close-Up, dissimilar PCs can easily connect, because Close-Up senses the video capabilities of both PCs and automatically displays Windows in a video mode compatible with both sides.

Risk-Free Offer!

Try Close-Up. If you're not absolutely convinced that Close-Up 5.0 is the fastest remote program, we'll give you your money back!* Order Close-Up Host & Remote, a complete system, for only \$199.95

Upgrade your current or competitive remote program to new Close-Up 5.0. Get both sides, Host & Remote, for only \$69.95

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Norton-Lambert



We invite you to reproduce this test. We used two identical Gateway 4DX2-66V's with 66-MHz Intel 486DX2-66 CPUs, 16 MB RAM, 256KB RAM cache, 340 MB HD, IDE controller, no hardware disk cache. Video: Local Bus ATI Ultra Pro with 2MB VRAM, 640 by 480 pixels, 16 colors, VGADRV dated 3/10/92. Monitor 72 Hz. MS-DOS 5.0, SMARTDRV 2 MB cache. Modems: two 14,400 baud V.32bis. Test performed without verification by Ziff. All products are shipping versions. WinBench trademark of Ziff Communications Co. Windows trademark of Microsoft Corp.

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CIRCLE 346 ON READER SERVICE CARD

Utilities

Word for Word 6.0 Fights Our Digital Babel

BY GREGG KEIZER

With over 130 word processor, spreadsheet, database, and graphics translators, Master-soft's \$149 Word for Word, Windows Edition 6.0, promises to translate virtually any DOS, Windows, or Macintosh file from one file format to another, retaining formatting and fonts, layouts, and line breaks.

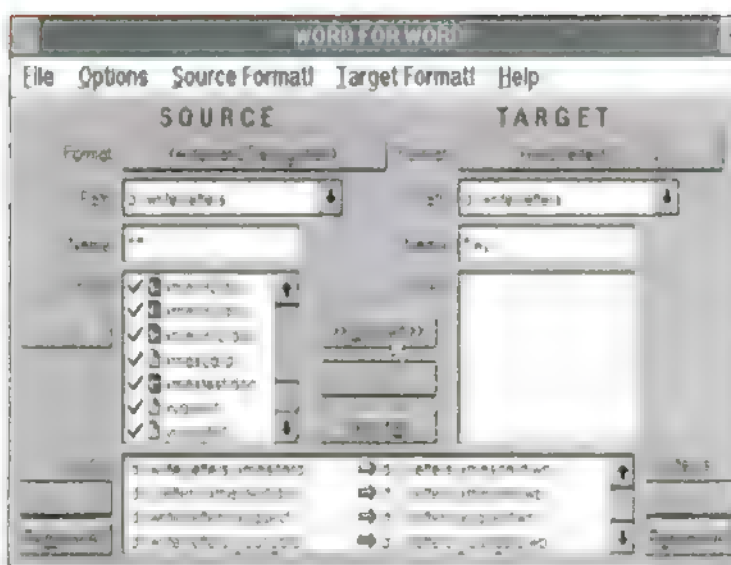
Word for Word keeps the snappy interface and automatic format recognition of its predecessor, then adds a much more useful file-viewing window. Selecting and converting files takes two clicks of the mouse in many cases and building batch jobs is just as easy; Word for Word handled more than 600 files in one test.

Word for Word's enhanced file viewer not only lets you look at a source document but also allows you to conduct text searches, zoom in and out, print the file, and copy the document to the Clipboard. Unlike more sophisticated viewing utilities such as Outside In for Windows, however, Word for Word won't let you select just a portion of the document to copy.

When translating relatively straightforward documents, particularly from one word processor format to another, Word for Word works remarkably well. Whether it's turning a Microsoft Word for Windows document into XyWrite III Plus form, creating an Ami Pro file from a WordPerfect original, or converting a DOS Word report into something suitable for MacWrite Pro on the Macintosh, the utility typically does an excellent job of preserving formats.

Word for Word's success is less consistent when it tries to process compound documents that include graphics, even when the various file formats are sup-

posedly supported by the utility. While a Word for Windows 2.0 document with embedded images arrived more or less intact in WordPerfect (both DOS and Windows), a change to Ami Pro dropped the graphics entirely. Moving the same document to MacWrite II resulted in an unusable file. Nor can Word for Word translate graph-



CONVERT: Word for Word, Windows Edition, lets you select entire directories for batch conversion chores.

ics with complete authority.

For advanced text-conversion duties, Word for Word wins

the day. But Mastersoft's first crack at dealing with compound documents and graphics translation is far from foolproof; ultimately, it can't completely eradicate our digital Babel.

• List price: Word for Word, Windows Edition 6.0, \$149; upgrade, \$39.95. Requires: 1MB RAM, 7MB hard disk space, Microsoft Windows 3.1. Mastersoft Inc., 8737 E. Via de Commercio, Scottsdale, AZ 85258; 800-624-

6107, 602-948-4888; fax, 602-948-8261.

Circle 429 on reader service card

Software

SmartSuite for OS/2: The Best (and Only) OS/2 Application Bundle

BY BEN Z. GOTTESMAN

Until now, OS/2 users have been left out of the Suite Wars (see this issue's cover story), but Lotus is attempting to change that with Lotus SmartSuite for OS/2. The \$795 package includes 32-bit native Workplace Shell versions of Lotus's Ami Pro word processor, 1-2-3 spreadsheet, Freelance Graphics presentation graphics software, and cc:Mail mail client (single-user license).

Ami Pro for OS/2 3.0 and Freelance Graphics for OS/2 2.0 strongly resemble their Windows cousins. Ami Pro takes full advantage of OS/2, including tabbed dialog boxes, REXX support within the macro language, and drag-and-drop on the Workplace Shell, but it is sluggish compared with the Windows version. Freelance is also a successful OS/2 port, though it's missing the Windows version's outliner and multimedia support.

1-2-3 for OS/2 2.0 is the weakest link in SmartSuite. The program lacks the ease of use and workgroup capabilities of its

Windows cousin, 1-2-3 for Windows, Release 4.01, and in our recent spreadsheet roundup ("Spreadsheets: Less Is More," January 11, 1994), PC Labs testing found the program's performance to be lacking as well.

cc:Mail for OS/2 1.01 feels very much at home in the object-oriented world of OS/2. Messages can be created simply by dragging objects across the desktop to the Prepare Message object. The OS/2 version also includes convenient Message

the Windows version.

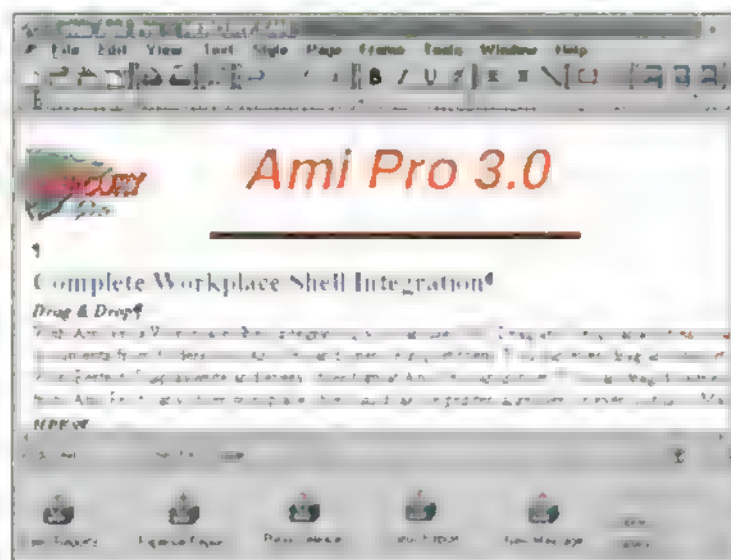
Like the Windows suites, the OS/2 version of SmartSuite is still more of a value pack than an integrated environment. There is no common installation or even a common look and feel to the installation programs. All of the programs do share Lotus's SmartIcons, but only Ami Pro and Freelance use the Lotus live status bar.

The OS/2 version of SmartSuite represents a major step in Lotus's commitment to OS/2.

Spreadsheet users will still want to look to one of the Windows spreadsheets, and Lotus must fine-tune the performance on some of the products, but SmartSuite is the most complete OS/2 offering to date.

• List price: Lotus SmartSuite for OS/2, \$795 (includes IBM OS/2 2.1 for a limited time). Requires: 12MB RAM, 26MB hard disk space, OS/2 2.1. Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, MA 02142; 800-343-5414, 617-577-8500; fax, 617-693-3899.

Circle 432 on reader service card



TOGETHER: Documents can be mailed quickly by dragging them from Ami Pro onto user-defined cc:Mail Message Template Objects.

Template Objects—essentially preaddressed envelopes—but doesn't support rules, found in

You're In Control



With OnView.™

Introducing the ViewSonic 17G — the first in our "Graphics" line of monitors. It's unique! It's powerful! And it's affordable!

This unbeatable monitor features the OnView™ control system, an innovative technology that displays the status of each adjustment and function on the screen. Yes, OnView does make it **very** easy to adjust controls with precise accuracy. Two of the "hottest" controls are: ViewMeter™, which shows the current refresh rate and scanning frequency of the monitor, and ViewMatch™, that adjusts screen colors to closely match printer output.

And it's "green"! Powering down to under five watts when inactive, the ViewSonic 17G supports the EPA's Energy Star program, and is compliant with MPR-II standards for low radiation.

If that isn't enough, the ViewSonic 17G has a special ARAG™ anti-reflection coating, Invar shadow mask and a specially-designed dynamic beam focus gun which provides a sharp, crisp screen image.

This feature-rich 17-inch monitor beats the competition — and the suggested retail price is only \$999!

COMPARITIVE CHART

	ViewSonic 17G	NEC 5FGe	NEC 5FGp
Screen Size	17"	17"	17"
Dot Pitch (mm)	0.28	0.28	0.28
Maximum Resolution	1280 x 1024	1024 x 768	1280 x 1024
Maximum Refresh Rate (Hz) Non-Interlaced	160	90	90
OnView Control	Yes	No	No
Color Matching	Yes	No	Yes
Power Saving	Yes	No	Yes
Non-Glare Screen	Yes	Additional Cost	Yes
Price	\$999	\$1,155	\$1,455

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Image courtesy of Autodesk Image Development Lab



OnView™ Menu

ViewMatch™

ViewMeter™

Dimensions (closed):
1.4" high x 11.1" wide
x 6.4" deep.

Weight: Less than
3 pounds; flash disk
model lighter.

Processor: 25-MHz
486SLC CPU.

Display: 640- x 480-dot
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16-level grayscale.

Available PCMCIA

Type II slots:

Flash disk model: 2 slots.

Hard disk model: 1 slot.

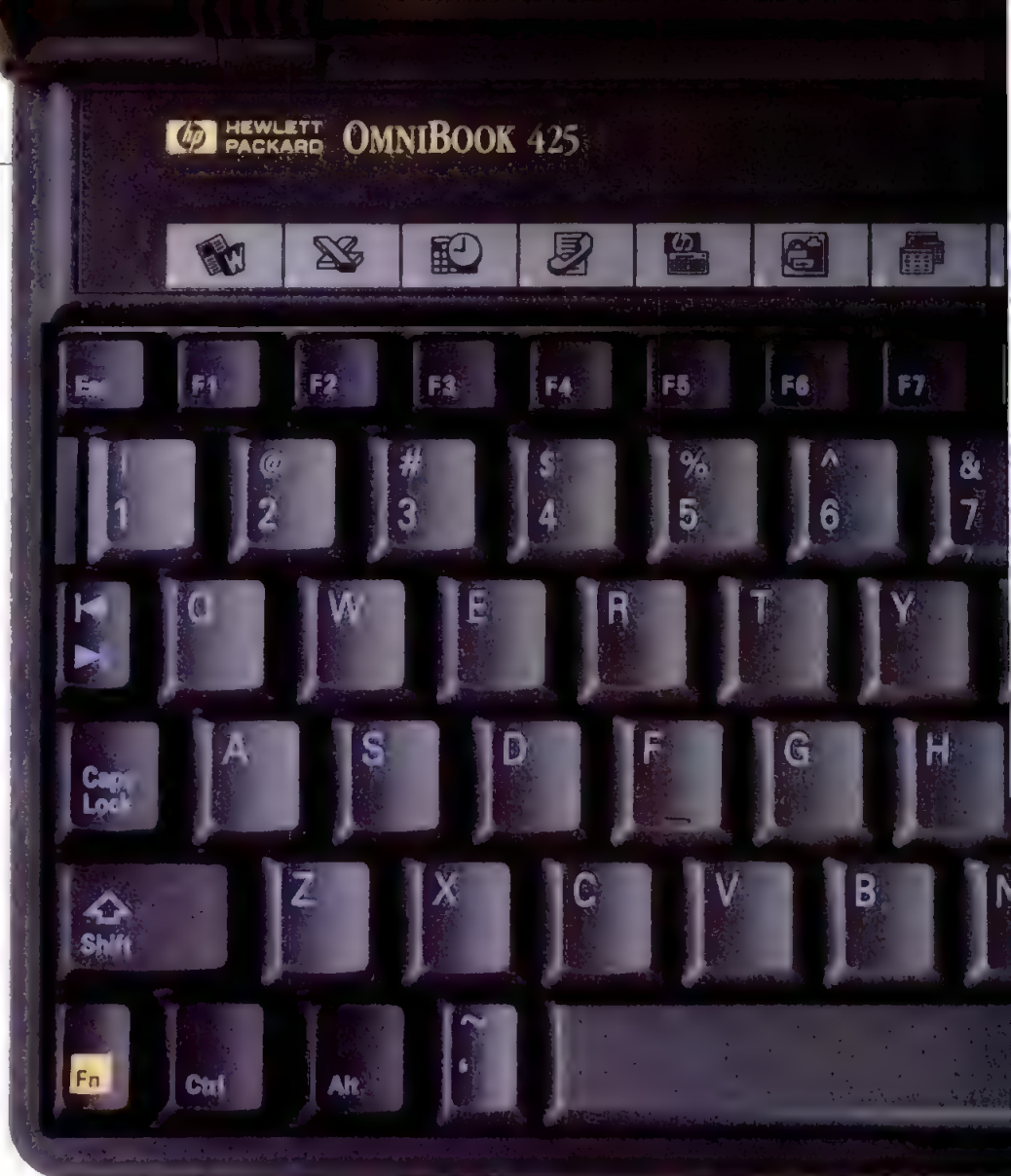
RAM:

2 MB expandable with
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and parallel. Optional
2400-baud data; 9600-
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to applications built into
ROM, it is also an organ-
izer. An appointment
and address book. An
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terminal.

Actual size ►



Now, 486 technology

The new HP OmniBook 425 PC is the best thing going for people who travel on business. Because it's the lightest full-function PC with a full-size keyboard. And it's loaded with all the features busy travelers need to take with them.

We trimmed the weight (less than 3 pounds). But not the full-size keyboard. Measuring a sleek 1.4" x 11.1" x 6.4", the



HP OmniBook 425 won't slow business travelers down. And their fingers can move across those familiar keys just as fast as on their office PC. Because the keys are the same size.



With 8 hours of battery life, travelers can keep on going. That's continuous use of the flash disk model. And the battery pack recharges in less than 1½ hours.

Or drop in four AA batteries. Even the hard disk model lasts 4½ hours between charges.

Microsoft® applications, built into ROM. Being built into ROM makes all the difference. It means Microsoft Word, Excel and Windows 3.1 come up instantly on the 9" LCD screen. No disk space is wasted. No time lost booting.

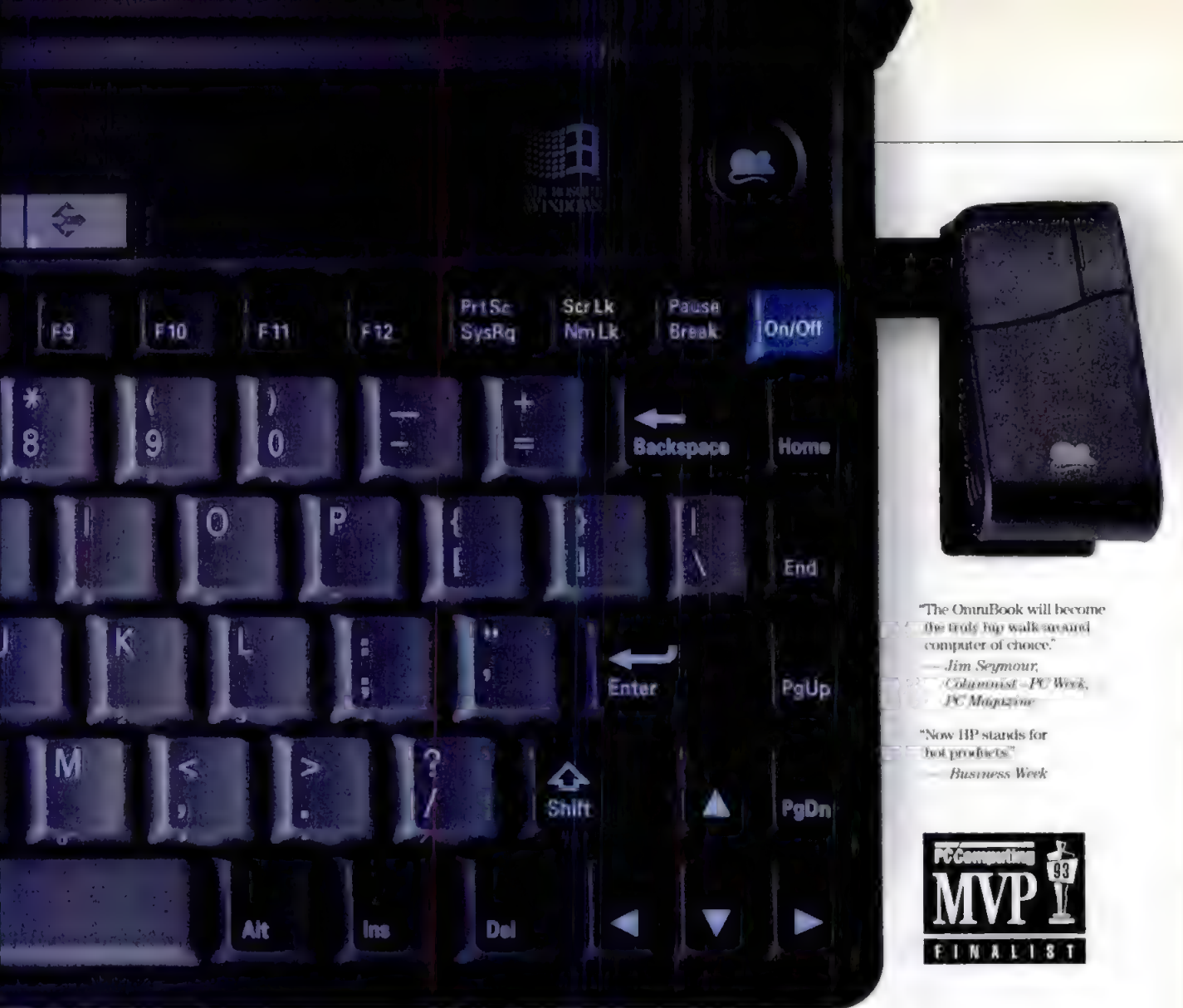


Or going in and out of applications. Instead, hit one function key and you're in business with your next application.

Built-in mouse saves space, works anywhere. Press a button. Out comes the mouse. It's not a ball or a stick. There's nothing extra to connect. It's a genuine mouse. And it pops up to make it as easy to handle as the ones people are used to working with. Which helps make working on the road as productive as in the office.

It turns on instantly in the same place it's turned off. Although this superportable turns completely off to save battery life, it keeps track of the last screen. And that's where it turns on again. It doesn't even have to boot up.





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—Jim Seymour,
Columnist—PC Week,
PC Magazine

"Now HP stands for
hot products."

—Business Week



is really going places.

The price to lighten your workload? The HP OmniBook 425 is just \$2,125 for the hard disk model; \$2,375 for the flash disk model. The HP OmniBook 300, with a 386 chip, is \$1,600 for the hard disk model; \$1,850 for the flash disk model.

For more information call 1-800-443-1254, Dept. 753. It's going to make a lot of workloads lighter. Including yours.

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Primavera software is being used to control the construction of the new \$30 million U.S. Embassy in La Paz.

Remote Sensing Satellite, Canada

RADARSAT is a low orbit satellite that will take radar images of the earth. The engineering, design and manufacturing stages for this \$300 million project are being scheduled using Primavera Project Planner® (P3®).

The Autobahn, Germany

P3 will be used to rebuild the Autobahn in what was formerly

East Germany. Both contractors and subcontractors are standardizing on Primavera for this project.

New Hong Kong Airport, Hong Kong

This \$20 billion airport construction project also includes the construction of highways, an airport rail system, a suspension bridge and a cable stay bridge. Projected completion is June 1997.

Kuala Lumpur Tower, Malaysia

This \$100 million, 420-meter tower will be the third tallest communication tower in the world. Estimated completion date is 1996.

The Georgia Dome, USA

The new \$210 million structure features the world's largest cable-supported dome. P3 and Expedition® were used for scheduling and control.

Think about project management, and one name comes to mind. Primavera.

It's the software that people who run projects have come to rely on.

Call 1-800-423-0245 for a Free Preview Disk that shows what Primavera Project Planner can do for your projects. Or ask for a personal demonstration of Primavera capabilities in scheduling, resource management, cost control, performance measurement, contract control, communication and risk analysis.

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New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Anush Yegyzarian

IMPROVED

WinWare's PIM Goes Pro

WinPro 2.0 is **WinWare's** latest release in the personal information management market. The Pro version has a number of features absent from Winfo, such as a calendar with to-do lists and recurring events, saddle-stitch phonebook views or printouts, and multiple pick list boxes. It also lets you customize your screens and add or delete fields so that the information is presented in the way most useful to you. It can print information in a variety of popular calendar styles. In addition, it lets you share your address and contact database, either fully or in part, with other Winfo Pro users across a network. Winfo Pro is compatible with Delrina WinFax Pro, letting you use the fax numbers in your PIM with WinFax.

- List price: *Winfo Pro 2.0*, \$99.95. **WinWare Inc.**, 4665 Lowell Roswell Rd., #9, Marietta, GA 30068; 800-336-5985, 404-612-0806; fax, 404-993-2351.

Circle 402 on reader service card

IMPROVED

One Step BeyondMail

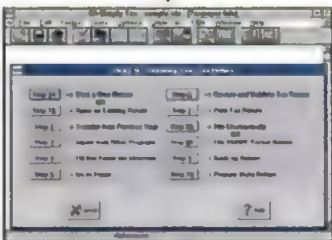
Beyond Inc. has released BeyondMail, Release 2.0 for MHS, an upgraded e-mail system with workflow capabilities for NetWare users. The new BeyondMail has an improved addressing scheme compatible with a wider variety of e-mail systems. It also offers a Serial Routing Slip function that lets you route documents to a predefined list of users in a sequential order, lessening the amount of paper traffic in the office and speeding circulation. An improved GUI administrative feature lets network administrators maintain and update mail users and synchronize lists with the NetWare Bindery.

The software includes Lotus Notes 3.0 Alternate Mailer Support and Watermark Software's Watermark Explorer Edition. BeyondMail can be integrated with several database forms like dBASE, Oracle, and Sybase.

- List price: *BeyondMail, Release 2.0 for MHS* (standard edition, ten users), \$695; *Professional Edition* (ten users, with workflow option), \$995. **Beyond Inc.**, 17 New England Executive Park, Burlington, MA 01803; 800-845-8511, 617-229-0006; fax, 617-229-1114.

Circle 403 on reader service card

HOT PROSPECT



Better than a Deduction: Free Tax Software from CA

Tax and free are two words that don't usually go together, but **Computer Associates International** has joined other tax software vendors by launching its own tax prep package, CA-Simply Tax, with a free giveaway. Anyone who calls by the April 15, 1994, IRS filing date can get Simply Tax for free (there is, however, a \$9.95 shipping and handling charge).

The software prompts you with questions and provides a checklist to make sure you get all your deductions. It organizes information by categories, such as business or entertainment expenses, then transfers the data to the appropriate form. It can also print returns on many IRS forms, or guide you through electronic filing. A "what if" option can examine up to four different filing scenarios to optimize your return.

The software includes a Tax Law Changes feature to keep you up to date on the most important changes in tax law; it also lists more than 60 commonly overlooked deductions. Kiplinger's CA-Simply Money, a money management program, is being packaged with this giveaway. Also available (for a price) are 30 state-specific versions of the software.

- List price: *CA-Simply Tax*, free; *state version*, \$19.95. **Computer Associates International Inc.**, One Computer Associates Plaza, Islandia, NY 11788; 800-225-5224, 516-342-5224; fax, 516-342-5734.

Circle 401 on reader service card

NEW & IMPROVED

Sharp's Three P's: Pen Wizards, Portables, and Printers

A pair of pen Wizards, two color notebooks, and two laser printers from **Sharp Electronics Corp.** have entered the market.

The lighter, trimmer OZ-9500 series of pen Wizards join their OZ-9600 brethren, offering slightly smaller but better-contrast screens, an expanded keyboard, and built-in telecommunications software. These personal information assistants also use infrared technology to communicate amongst themselves or, with an optional adapter, with printers and PCs. The OZ-9500 has 256K RAM; the OZ-9520, 512K. Both have a GUI interface, organizational software (calendar, scheduler, three phone directories), a bare-bones word processor, and even a security feature to safeguard selected information.

The two 33-MHz 486DX-based notebooks each weigh in at 6.4 pounds, including batteries, 4MB of RAM expandable to 20MB, 200MB hard disk, one 3.5-inch floppy disk drive, and one



New entries in the mobile market: the Wizard OZ-9500 and the PC-8650 color notebook.

Type II PCMCIA slot. The PC-8650 features an active-matrix screen slightly on the small side at 8.4 inches, while the PC-8150 has a 9.4-inch passive-matrix dual-scan screen. Both have optional external trackballs for \$89.

The new additions to the Sharp printer family have 600-dot-per-inch resolution, PCL 5 and PostScript emulation, and 2MB of RAM (expandable to 9MB). The JX-9460PS prints at 6 pages per minute and has one 250-sheet tray; the JX-9660PS, an 8-ppm model, has two 250-sheet trays. Both have a sleep feature, 62 built-in fonts, and memory-saving Softband technology from PhoenixPage.

• List price: Wizard OZ-9500, \$589.99; Wizard OZ-9520, \$719.99; PC-8650, \$3,699; PC-8150, \$3,199; JX-9460PS, \$1,199; JX-9660PS, \$1,499. Sharp Electronics Corp., Sharp Plaza, Mahwah, NJ 07430; 800-237-4277, 201-529-8100; fax, 201-529-9637.

Circle 404 on reader service card

NEW

Taking Ambra on the Road

Ambra Computer Corp., a sudden presence in the highly competitive mail-order PC marketplace, is venturing into portable PCs as well. It has introduced two new lines: the SN subnotebook series, with different configurations based on a 486SX/25, and the N series, full-size notebooks with CPUs from 486SX/33s to 486DX2/50s.

SN-series subnotebooks weigh 4 pounds with battery. They have 4MB of RAM (expandable to 20MB), a removable 80MB or 170MB hard disk, an integrated trackball, and one Type II PCMCIA slot. They come with either a passive-matrix color or monochrome display; an external 3.5-inch floppy disk drive is \$99.

N-series notebooks weigh 6.6 pounds with the battery, have 4MB of RAM expandable to 12MB, a 120MB or 200MB hard disk, a 3.5-inch floppy disk drive, an integrated trackball, and one Type III PCMCIA slot. The SX/33 model comes only with passive-matrix dual-scan color, but the DX2/50 model is also available with an active-matrix screen.

• List price: SN series, \$1,399 to \$1,899; N series, \$2,299-\$3,999. Ambra Computer Corp., 3200 Beechleaf Ct., Raleigh, NC 27604; 800-252-6272, 919-713-1550; fax, 919-713-1599.

Circle 407 on reader service card

NEW & IMPROVED

Shifting Tax Software to A Higher Gear

ChipSoft, now owned by Intuit, has released two software packages to ease the 1993 tax season: the newest TurboTax and the new TurboTax Tax Savings Guide, both for Windows or DOS.

The TurboTax upgrade has a new Deduction Finder, and its Tax Graphs illustrate your tax situation. ChipSoft has made its Interview feature easier to use and has added more help for small businesses and home offices.

The TurboTax Tax Savings Guide is a collection of 250 different tips and strategies for reducing tax liability in individual financial situations. It gives you three ways to access these strategies: you can answer questions about your financial situation, go through an index, or do a

BRIEFS

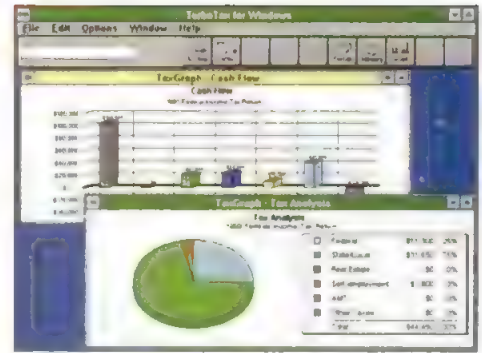
HARDWARE

NCR Corp. has released AT&T-brand 60-MHz Pentium computers with PCI bus technology designed for small or home offices. With prices that start at \$2,999, the systems have 8MB of RAM, 345MB hard disks, five expansion slots with four drive bays, and one 3.5-inch floppy disk drive. The units will be available through the retail channel only at this time. 800-637-2600, 513-445-5000

PCI and Pentium is a combination that **Ambra Computer Corp.** also finds appealing, so it's adding that to its PC line. An entry system priced at \$2,799 has 8MB of RAM (expandable to 128MB), a 340MB hard disk, a 14-inch monitor, six drive bays, and seven expansion slots. A higher-end system, \$3,499, has some of the same features as the lower-end unit but includes a 440MB hard disk, a double-speed CD-ROM drive, and a 15-inch monitor. 800-252-6272, 919-713-1550

Dell Computer Corp. is offering its OmniPlex PCs with Pentium CPUs and PCI local bus architecture. Two models are available, the \$3,499 OmniPlex 560 with the 60-MHz Pentium, and the \$3,999 566 with the 66-MHz CPU. Both have 8MB of RAM (expandable to 192MB), a 120MB hard disk, a 3.5-inch floppy disk drive, five drive bays, three EISA and two PCI expansion slots, a 1MB PCI video card, and a Super VGA monitor. Larger hard disks, CD-ROM drives, fax modems and tape backup drives are available as options. 800-289-3355, 512-338-4400.

Quadrant Components has released two multimedia PCs with real-time MPEG video capabilities. The Video-Tiger, a \$3,995 entry-level system, comes with a 486DX/33 CPU, a double-speed CD-ROM drive, 5.25-inch and 3.5-inch floppy disk drives, a 16-bit sound card, a 1MB SVGA card, and speakers. It has a 500MB hard disk, 8MB of RAM expandable to 32MB, a 14-inch monitor, and the 30-fps XingIt!, a video capture and compression card. The desktop case holds five drive bays, and there are six ISA and two VESA slots. Xing's Picture Prowler, an image manager, is also included.



TurboTax charts your taxes, income, and deductibles.

keyword search. Also included are examples of how to implement the suggestions.

• List price: *TurboTax*, \$69.95; *TurboTax Tax Savings Guide*, \$19.95. *ChipSoft Inc.*, 2650 E. Elvira Rd., #100, Tucson, AZ 85706; 800-964-1040, 602-295-3110; fax, 800-756-1040.

Circle 406 on reader service card

NEW & IMPROVED

Money, Money, Money

Meca Software Inc., Intuit Inc., and Insight Software Solutions are offering different ways to manage, invest, and save your money.

Meca has improved many standard features in Managing Your Money 10, such as Check Register, which is now more customizable, and the Portfolio Menu, with a more accessible Historical Prices option. It has also added a Debt Reduction Module that helps you calculate your total debts and shows how to pay them off faster so that you can start saving money. The Help section has been expanded and includes new indexes and a new tutorial. The new tax laws have also been added to the tax estimator portion of the software.

Intuit has released Quicken 3 for Windows, its personal finance management software, in CD-ROM format. Included on the CD are Quicken Companion 2, on-line documentation, The Wall Street Journal Video Guide to Money and Markets, The Wall Street Journal Personal Finance Library, the Tradeline Electronic Stock Guide from IDD Information Services, and more than 20 government publications on personal finance. There is a \$10 rebate for those purchasing the CD through retail channels and a \$5 rebate through mail order.

Finally, Annuity Ace makes its debut. This DOS software package manages your savings, allowing you to enter withdrawals, deposits, interest rates and cost of living adjustments, and calculate the impact of taxes. It also helps you make a savings plan so that you can project what you will have when you reach retirement.



**YOU KNOW HOW SOME
THINGS ALWAYS LOOK GOOD
FROM A DISTANCE?**

As anyone who's ever been in the desert can tell you, things aren't always as they appear. Whether it's an oasis in the sand. Or a suite of application software in the office.

Unless you look very closely, for example, you'd swear Microsoft® Office was a revolutionary new way to use, manipulate and share business data precisely that across all five applications. Sharing

And while Microsoft claims Office is going to fully maximize cross-product integration and consistency, Lotus is already way down the road to achieving

LOTUS SMARTSUITE 2.1 vs. MICROSOFT OFFICE PRO	
APPLICATIONS	
1-2-3® RELEASE 4 AMI PRO® 3.01 FREELANCE GRAPHICS® 2.01 APPROACH® 2.1 ORGANIZER™ 2.1	EXCEL 5.0 WHEN AVAILABLE WORD 6.0 POWERPOINT™ 4.0 WHEN AVAILABLE ACCESS™ COUPON FOR 1 SEAT OF MICROSOFT MAIL
INTEGRATION	
LOTUS APPLICATION MANAGER COLLECT & COPY DDE, OLE CONSISTENT USER INTERFACE	MICROSOFT OFFICE MANAGER DDE, OLE (2.0 IN WORD) SEMI-CONSISTENT USER INTERFACE
WORKGROUP	
ALL APPS MAIL-ENABLED VERSION MANAGER™ INTEGRATED WITH NOTES™ THRU NOTES/FX™	ALL APPS MAIL-ENABLED SCENARIO MANAGER
VALUE	
\$299 COMPETITIVE UPGRADE	\$348 COMPETITIVE UPGRADE

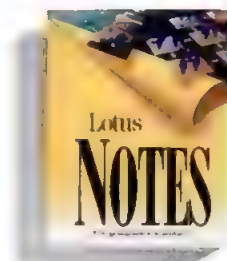
MAYBE YOU'D BET LOOK AT MICROSOFT

through integrated software. When, in reality, the same user interface. With common menus. And Lotus® SmartSuite® achieved that distinction over a year ago.

A closer inspection will also demonstrate that not all of Microsoft Office's five applications are designed for general business users.

And some new versions aren't yet available at all. Lotus SmartSuite, on the other hand, has five of the leading

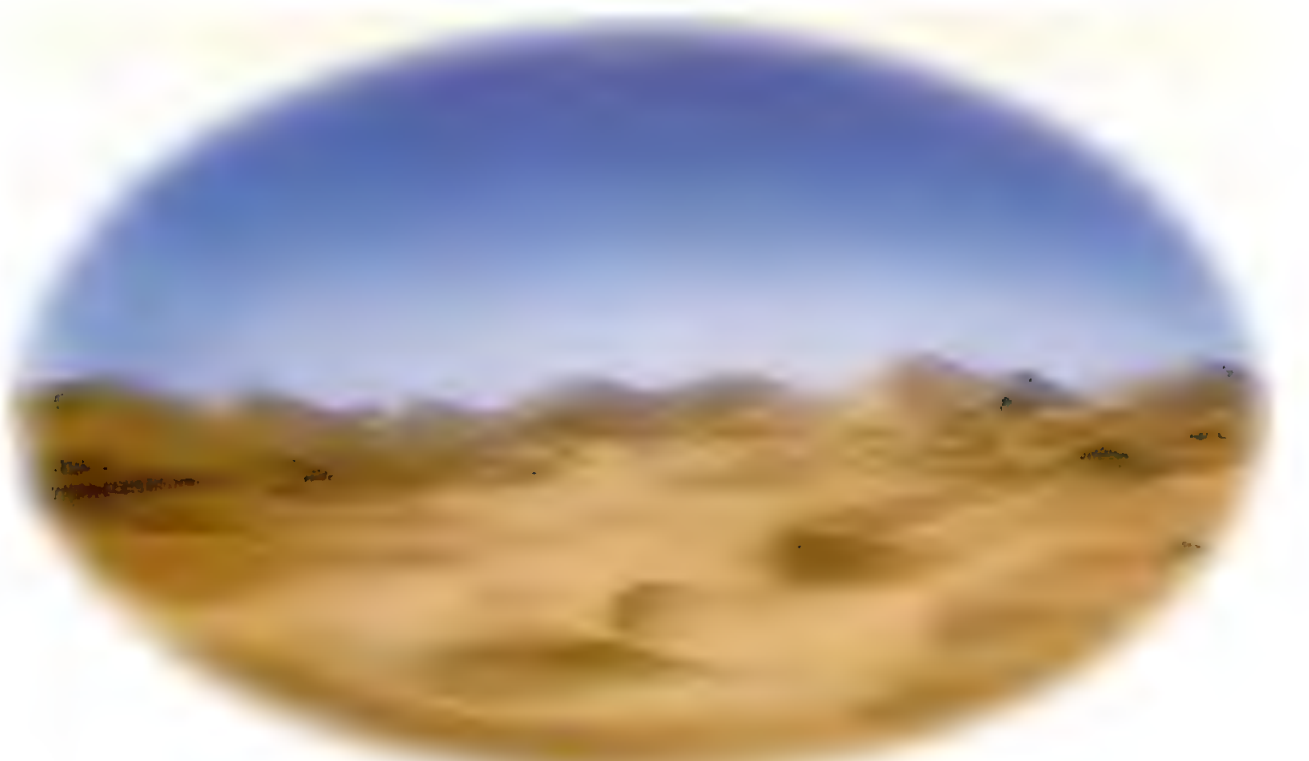
SmartIcons®. To say nothing of task-oriented functions that cross applications. Collect and Copy for instance. With a single click it lets users gather data from 1-2-3® and Freelance Graphics® and combine it into an Ami Pro® word processing document.



SmartSuite and Lotus Notes. The secret to integrating workgroups instead of just applications.

Of course, you might be just as easily deluded

*In Canada call 1-800-GO-LOTUS. **\$299 direct from Lotus. Offer good while supplies last. Qualifying competitive products are Microsoft Excel, Borland® Quattro® Pro (excluding Quattro Pro SE and Quattro Pro 5.0), products include 1-2-3 (excluding 1-2-3 for Home), Symphony®, Ami Pro, Freelance Graphics, Approach and Graphwriter®. ©1993 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. All rights reserved. Notes/FX are trademarks of Lotus Development Corporation. Microsoft and PowerPoint are registered trademarks and Windows and Microsoft Access are trademarks of Microsoft Corporation. Borland, Quattro, dBase are registered trademarks of International Business Machines Corporation. Harvard Graphics is a registered trademark of International Business Machines Corporation.



NEVER TAKE A CLOSER LOOK AT OFFICE AFTER ALL.

into believing that Microsoft Office is workgroup

multiple users working in collaboration.

enabled. When, in fact, Office can only integrate

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or competitive product to SmartSuite 2.1

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data like never before. Not only can it be routed, it

assure you, this is one time you really

can be revised, stored and accessed concurrently by

will be able to believe your eyes.

Lotus
Working Together™

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New & Improved

• List price: *Managing Your Money 10*, \$79.95; upgrades, \$29.95. **MECA Software Inc.**, 55 Walls Dr., Fairfield, CT 06430; 800-820-7457, 203-256-5000; fax, 203-255-6300.

Circle 411 on reader service card

• List price: *Quicken for Windows, CD-ROM Deluxe Edition*, \$124.95; upgrades, \$64.95. **Intuit Inc.**, 155 Linfield Ave., Menlo Park, CA 94026; 800-624-8742, 415-322-0573.

Circle 412 on reader service card

• List price: *Annuity Ace*, \$25. **Insight Software Solutions**, P.O. Box 354, Bountiful, UT 84011; 801-295-1890; fax, 801-299-1781.

Circle 413 on reader service card

NEW

Bubble Jet Printing on the Go

The compact, 3.7-pound⁺ BJ-10sx, **Canon Computer Systems'** newest Bubble Jet printer, has 360-dpi output and a print speed of 110 characters per second. It handles envelopes, A4, legal, and letter-size documents. The printer comes with an AC

adapter but has a

\$50 optional battery pack with a 1-hour life that lets you print up to 40 pages with each charge. If you have multiple

copy requirements, Canon offers a \$90 50-page sheet feeder. The unit has a 37K buffer and meets Energy Star needs.

• List price: *Canon BJ-10sx*, \$349. **Canon Computer Systems Inc.**, 2995 Redhill Ave., Costa Mesa, CA 92626; 800-848-4123, 714-438-3000; fax, 714-438-3099.

Circle 409 on reader service card

The new portable
Canon BJ-10SX.



IMPROVED

Better Project Management For OS/2 and Windows

With CA-SuperProject 3.0, **Computer Associates International** puts project management software for both OS/2 and Windows into one package. This release features new charting and report capabilities, as well as customizable screen formats, fields, and formulas. There's also a Project Manager's Assistant with a Fast Start section that prompts you in creating new projects; it has an editable help section so that you can add your own notes to the instructions. Special functions help optimize time and resources, let you chart up to 14 items simultaneously, and show precedence

BRIEFS

HARDWARE

The \$5,495 corporate-level MediaQuad has a 486DX2/66 CPU and comes with 16MB of RAM, a 1GB hard disk, a fax modem, and XingSound, an MPEG audio compression product. Other specifications are the same as for the VideoTiger. 510-656-9988.

Those eager to play—as well as work—while they travel with their notebooks have **Colorado Spectrum's** Notebook Gameport to help. A full game and serial mouse port, it connects to the serial port and costs \$54.95. 800-238-5983, 303-225-1687.

Reveal Computer Products Inc. has released its \$299 SoundFX WAVE 32, a 16-bit card with wavetable capabilities that can play, record, and mix 16-bit sound at 44.1 kHz. It's compatible with MIDI and Microsoft Windows Sound System, has a CD-ROM and MIDI interface, and a joystick port. Reveal bundles several Voyetra audio and multimedia titles, as well as SuperJam! Jr., with the card. 800-326-2222, 818-713-1400.

The new 2000DC monitor from **Optquest** is Energy-Star (and VESA DPMS) compliant. Priced at \$469, it has a noninterlaced resolution of 1,280-by-1,024 and 0.27-mm dot pitch. 800-843-6784, 909-468-3750.

SOFTWARE

WriteType, Version 1.0, \$349.95, from **Signature Software**, has a new font for your computer: your own handwriting. You simply mail in a sample of your handwriting, then receive the font two to four weeks later. The font is compatible with Macs or Microsoft Windows. 800-925-8840, 503-386-3221.

MicroLogic Software has added to its MoreFonts for Windows collection. There are now 96 body text and 49 display fonts included, a total of 145 scalable typefaces that can be installed as TrueType or PostScript. The program also lets you scale TrueType, PostScript, AGFA, or Bitstream fonts and add numerous special effects to them. It works with Microsoft Windows drivers and is priced at \$59.95. 800-888-9078, 510-652-5464.

relationships in date order or as dependencies. The included CA-Realizer 2.0, a development language, helps you further customize the program. A Unix version is available.

• List price: *CA-SuperProject 3.0*, \$649; upgrades, \$149. **Computer Associates International Inc.**, One Computer Associates Plaza, Islandia, NY 11788; 800-737-3382, 516-342-5224; fax, 516-342-5329.

Circle 408 on reader service card

NEW

A Database for All Data Types

The Montage object-relational SQL database management system from **Montage Software** lets you store, manage, and analyze a variety of data types ranging from traditional numbers and text to audio, video, and images.

This database system has three parts: the Montage Server engine, the Montage Viewer, and the optional Montage DataBlades modules. The server engine manages all data types the same way, which makes it easier to develop applications that integrate these data types. It is created for the client/server environment and uses SQL3-based extensions.

The viewer organizes information in visual terms and lets you navigate through the data: You can peel through layers and focus or pull back and veer elsewhere. It uses the 5th Generation Environment application builder, which has predefined queries for ease of use.

The DataBlades are \$695 add-on modules designed to optimize and extend the capabilities of the database in specific areas. For example, the Spatial DataBlade defines nine basic spatial types and lets you use SQL functions on them. Also available are Image DataBlade and Text DataBlade.

Like other databases, Montage includes typical features such as security, transaction control, and recoverability.

• List price: *Montage ORDBMS (single user)*, \$995. **Montage Software Inc.**, 2000 Powell St., #1405, Emeryville, CA 94608; 510-652-8000; fax, 510-652-8050.

Circle 414 on reader service card

NEW

Serving up Four Parallel Ports for Network Printers

ASP Computer Products has released the JetLAN 4P print server, which lets you connect four printers to one Ethernet connection via NetWare.

The product offers a number of security fea-



PREPARE TO LOOK AT PROJECT MANAGEMENT IN A WHOLE NEW WAY.

Introducing Project Scheduler 6 for Windows.™

Easy-to-use project management software with the advanced features you've been missing.

Now you can easily analyze and report rapidly changing schedules and resource availability with greater accuracy and speed.

Sophisticated modeling features like the Advanced Resource Tracking Spreadsheet (ARTS™) make Project Scheduler 6 the only Windows-based product to let you enter and evaluate

resource costs and usage on a period by period basis. Performing multiple "what-if" scenarios is also a breeze with its ability to do multiple undo/redos in seconds.

You can manage multiple projects from a single resource base and rearrange activity information by function (WBS), organization (OBS) or resource (skill codes) – making it easy to view and present data in the most meaningful way. And with Project Scheduler 6's

unique ability to build an ODBC project repository, spreadsheet and database users from other departments can access and update project data for added efficiency.

Project Scheduler 6 lets you build standardized screens and reports for consistency across your entire organization, or create custom formats on the fly for ultimate flexibility and impact.

Our object-oriented report writer offers outstanding layout versatility not usually found in project management software. It allows you to select and precisely place data fields, change fonts on-screen, and even incorporate colorful logos for sensational-looking reports.

All of our software comes with free telephone support that won't keep you waiting in an electronic queue and includes access to



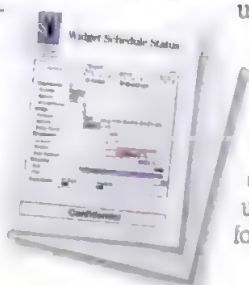
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the project management experts who developed the entire Project Scheduler series of multi-platform software. Scitor also offers the most comprehensive training and consulting programs in the industry.

If you're looking for project management software that offers both powerful features and true ease-of-use, then take a closer look at the new Project Scheduler 6 for Windows today!

Scitor Corporation



New & Improved

tures. Its Supervisor Authentication feature can limit access to JetLAN settings by other supervisors. The JetLAN 4P also supports Novell's password encryption.

The JetLAN 4P can manage up to 40 print queues on 16 file servers. You can configure it to print on the first available printer or to serve specific print queues. It automatically senses the type of network in place and supports both 10BaseT and 10Base2.

A promotional "Trade-Up" is in effect until January 31, 1994. You can trade in your old print server boards and upgrade to JetLAN 4P with a 40 percent discount on the list price.

- List price: *JetLAN 4P*, \$795. *ASP Computer Products Inc.*, 160 San Gabriel Dr., Sunnyvale, CA 94086; 800-445-6190, 408-746-2965; fax, 408-746-2803.

Circle 415 on reader service card

NEW

Scan In Black and White or Color

Microtek Lab has released one monochrome and one color scanner.

ScanMaker IIG has resolutions up to 300 by 600 dpi optical and 1,200 dpi with interpolation. It has 2-, 4-, or 8-bit gray-scale modes, with up to 256 shades of grey. Microtek bundles it with Caere's OmniScan Software Edition, a suite of office applications including OmniPage Direct, Image Assistant GS, and FaxMaster.

ScanMaker IISP, the color unit, has the same optical and interpolated resolutions as the IIG but offers 24-bit and single-bit scanning modes also. For color accuracy, Microtek includes its Dynamic Color Rendition color-calibration system with the ScanMaker IISP. Adobe Photoshop 2.5 LE and Caere's Personal PageKeeper Portfolio come with the unit.

Both scanners are compatible with PCs or Macs, have ASPI drivers, and are Twain-compliant, using Microtek's Twain for Windows scan module. A 50-page automatic document feeder is optional for \$499, and a transparency adapter is available with the IISP for \$799.

- List price: *ScanMaker IIG*, \$649; *ScanMaker IISP*, \$900. *Microtek Lab Inc.*, 3715 Doolittle Dr., Redondo Beach, CA 90278; 800-654-4190, 310-297-5000; fax, 310-297-5050.

Circle 416 on reader service card

NEW & IMPROVED

Latest IconAuthor Runs Under OS/2

AimTech Corp. has released IconAuthor 5.1, its multimedia authoring software, for both Windows and OS/2. The OS/2 version is the

BRIEFS

SOFTWARE

For a more general aid in text file viewing, there's QRead 1.2 from **DS Products**. The new release has a drag-and-drop feature that lets you drag files to the icon and read them automatically. You can also print the window or the entire file from QRead and launch an editor from it. QRead has automatic file sizing and can fit text to the window. It's available for a \$20 license fee through CompuServe's Winshare forum.

Raosoft Inc. has released Raosoft Survey 2.5, \$495, a DOS-based analysis and statistical database system. Besides expanding options for form design, this version improves the program's capacity to do analyses and produce reports. More on-line help is included, as well as password protection and access restriction. 206-525-4025

Relay Technology has released the \$399 Relay/PC Gold 6.0, an upgrade for its Windows communications software package, formerly available from Microcom. The new version adds support for TCP/IP (TCP/IP Telnet and TN3270). Its more standard GUI interface offers better Windows support and has drag-and-drop features. Version 6.0 also allows on-screen viewing of multiple and simultaneous communications sessions. It also has better connectivity to mainframes or LANs, has enhanced internal buffering, and supports block sizes up to 32K. A LAN version is available. 800-795-8674, 703-506-0500

Jensen-Jones Inc. is offering an entry-level version of Commence 2.0, its personal information manager. Called Commence Start-Up, the new \$49.95 PIM has all the basics but is designed for novices and needs no network support. 800-688-7080, 908-530-4666.

FYI Software's Buying a Home can help you do just that. Sold for \$29.95, this Windows program helps you calculate the highest mortgage payment you can afford and qualify for, estimates home costs and your projected salary in different parts of the country, and, among other things, can provide you with a personal credit report. 800-394-2010, 203-248-9991.

first released for that operating system.

New features include Hot Words, which lets you mark a string of text to make it end-user selectable, then makes the selection trigger an event, such as a pop-up definition. A new drag-and-drop feature lets you make a simulation more realistic by letting the end user drag objects with a mouse. The new version also supports irregularly shaped graphics objects and additional file formats like Pict, Targa, and TIFF.

A four-day training course is included with the software.

- List price: *IconAuthor 5.1*, \$4,995; *upgrade only*, \$695. *AimTech Corp.*, 20 Trafalgar Sq., #300, Nashua, NH 03063; 800-289-2884, 603-883-0220; fax, 603-883-5582.

Circle 417 on reader service card

NEW

Five Applications in One at The Push of a Button

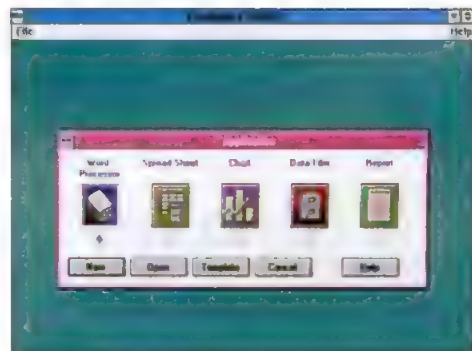
PushButton Works, adapted from a European "all-in-one" program, is now available from **PushButton Software**.

The program integrates five popular business applications: a word processor, spreadsheet, database, charts and graphs, and a report writer, making them available at the touch of a mouse button. The applications have special features including a table editor in the word processor that lets you add rows or columns by drawing them with a mouse, and a formula bar to simplify the creation of formulas in the spreadsheet.

PushButton Software has improved the original European design by adding over 60 business templates and simplifying the user interface. The software includes OLE and MDI support, is designed for small businesses or home offices, and has a money back guarantee.

- List price: *PushButton Works*, \$49.99. *PushButton Software Inc.*, 1700 West Park Dr., Westboro, MA 01581; 800-277-7874, 508-366-6939; fax, 508-366-8010.

Circle 418 on reader service card



PushButton Works features five linked applications.

Pacific DirectNet. Automatically easier.

POSTSCRIPT
Language Emulation SIMM with purchase of
Pacific DirectNet for Novell/UNIX/EtherTalk
One card will take you to 1994

Pacific DirectNet was designed to make life on a network easier. It's fast. It's easy to use. And, unlike JetDirect from Hewlett-Packard, it can adapt to whatever network protocol comes its way. Automatically.

The board connects to any Ethernet network, supporting Novell NetWare, UNIX TCP/IP, and EtherTalk operating systems. With automatic switching, users won't be troubled by having to switch protocols at the printer front panel.

Because it supports standard UNIX printing and file transfer protocols, setup in UNIX is a breeze. Pacific DirectNet connects to virtually all UNIX TCP/IP networks including Sun, HP, IBM, DEC, SCO, Solaris, and Interactive UNIX. And it also contains an SNMP agent that allows network management software to recognize and manage printers like it does other network devices.

Pacific DirectNet offers support for an unlimited number of file servers and queues, as well as for multiple, simultaneous PSERVER and RPRINTER connections on Novell networks. This way users are provided greater flexibility to select any printer on the LAN.



	Pacific DirectNet	HP JetDirect
Automatic Novell, EtherTalk and TCP/IP switching on LaserJet 4		
Support of standard UNIX printing and file protocols for broad cross platform support		
Fast and easy UNIX setup — simply enter IP address		
Novell/UNIX/EtherTalk list price	\$599	\$499
LJ4 PostScript Language Emulation SIMM	included*	\$499
	\$599	\$998

The easiest way to share a LaserJet printer on a network.

guarantee of satisfaction, and free technical support. And, for a limited time, the Novell/UNIX/EtherTalk board comes with PostScript® emulation — all for the standard low price of \$599! Or, if you only need Novell NetWare support now, start with our Novell version for only \$399 (HP price \$499), and upgrade later.

For more information on Pacific DirectNet, a dealer near you, or to order direct from Pacific Data Products, call us at (619) 625-3657, FAX (619) 552-0889.



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PRODUCTS**



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Backup the data where it's at.

At the corporate network



PowerTape Series 4000

- QIC compatible
- 2 Gigabyte native/4 GB compressed capacity
- Up to 18 MB/minute backup speed
- Includes software, data cartridge and more
- Optional Cheyenne ARCserve for PowerTape*



PowerDAT Series 6000

- Digital Data Storage (DDS) technology
- 2 Gigabyte native/4 GB compressed capacity
- Backs up 300 MB as fast as 30 minutes
- Includes software, data cartridge and more
- Optional Cheyenne ARCserve for PowerDAT*



PowerTape Series 2400

- Quarter Inch Cartridge (QIC) compatible
- 2 Gigabyte native/4 GB compressed capacity
- Up to 18 MB/minute backup speed
- Includes software and more
- Optional Cheyenne ARCserve for PowerTape*

At the workgroup network



PowerTape Series 1100

- QIC compatible
- 525 MB native/1.05 GB compressed capacity
- Up to 12 MB/minute backup speed
- Includes software and more



Jumbo 500 AVAILABLE EARLY 1994

- QIC compatible
- 255 MB native/500 MB compressed capacity
- Up to 9.3 MB/minute backup speed
- Includes software, minicartridge and more

At the workstation



Jumbo 250

- QIC compatible
- 125 MB native/250 MB compressed capacity
- Up to 9.3 MB/minute backup speed
- Includes software and more



Jumbo 120

- QIC compatible
- 60 MB native/120 MB compressed capacity
- Up to 4.7 MB/minute backup speed
- Includes software and more

On the move



Jumbo Trakker 250

- Parallel port interface
- QIC compatible
- 125 MB native/250 MB compressed capacity
- Up to 8 MB/minute backup speed
- Includes software and more



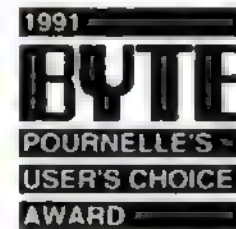
Jumbo Trakker 120

- Parallel port interface
- QIC compatible
- 60 MB native/120 MB compressed capacity
- Up to 4 MB/minute backup speed
- Includes software and more

Optional Accessories



- Colorado® Brand tapes
- Colorado Backup for Windows software
- Support for UNIX®, OS/2® and Windows NT®
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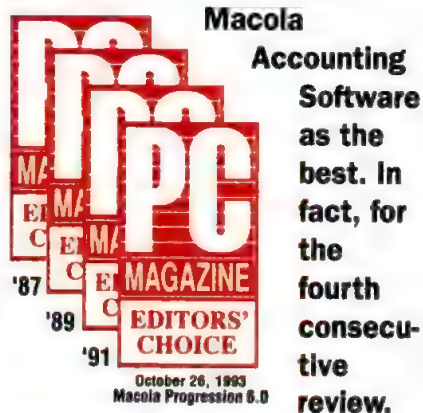
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REVIEWS OF THE LATEST BOOKS FOR THE PC USER

Edited by Lance Ulanoff

WordPerfect 6.0 for DOS: Beyond the Manual

BY EDWARD MENDELSON

WordPerfect 6.0 for DOS has the deepest set of features of any DOS application ever written, but when you find that its own 900-page manual and help files can't answer your hard questions, it's time to choose from among the dozens of books that fill the WordPerfect shelf at your local bookstore.

The best source of information on WordPerfect has for years been Que's Using WordPerfect series. The latest book in that series, *Using WordPerfect 6, Special Edition*, by Que Development Group, maintains this strong tradition.

Seventeen authors combined their expertise for this book, which moves quickly from the basics into advanced formatting, mail-merging, outlining, and customizing techniques. Other books paraphrase the WordPerfect manual, but Que shows you how to use WordPerfect features to solve problems that the manual never mentions.

Instead of simply listing features, *Using WordPerfect 6* takes you through the steps needed to make the features work correctly. WordPerfect's equation editor is notoriously unintuitive, but Que's book supplies all the advice you need to use it effectively.

Among the outstanding chapters of this book are a section that makes sense of Word-

Perfect's complex method of handling screen and printer fonts, and one with imaginative tips for creating and managing styles. The chapter on file conversion and exchange is essential reading for anyone who works with more than one application.

Not everything in the book matches these high standards, however. The chapters on desktop publishing are too brief. Also, the advanced macro and merge techniques described in earlier editions of the book are no longer included.

If you have room on your shelf for only one general book on WordPerfect, choose this one.

MORE POWER

WordPerfect 6 Power Tools by Gordon McComb is the book that every advanced WordPerfect user has been waiting for. No one knows more about WordPerfect macros and merges than McComb, and these are the aspects of the program that are the worst-documented in WordPerfect's manual and help screens.

The book offers everything there is to know about macro and

Visual Learning?

If you're in charge of an office in which users have trouble learning WordPerfect from the manual or from third-party books, consider buying a tutorial book that uses few words and hundreds of colorful pictures to get its points across.

One of the best of these visual guides is *WordPerfect 6 for DOS: The Visual Learning Guide*, by Grace Jeoly Beatty and David C. Gardner (\$19.95, Prima Publishing, 916-786-0426; ISBN: 1-55958-310-x). Four hundred and fifty screen images take readers from the DOS prompt through formatting and file management, and on to tables and mail-merge. You won't learn advanced techniques here, but you won't be able to avoid learning the basics.—EM



merge programming and comes with a disk filled with hundreds of macros, documents, and templates, an automated letter-writing system, and other tools that you can customize or use in their original forms. Even if you don't want to learn the advanced techniques taught in the text of the book, the disk alone is worth the purchase price.

WordPerfect doesn't come with a dialog box editor, but the disk includes a usable demonstration version of a \$50 commercial dialog editor from UI*GUI Software.

McComb's macro techniques are powerful enough to create professional-level macro applications, complete with full-screen menus. With his plug-in routines, including functions as complex as calen-

dars in your macros is an effortless process.

The book provides the most advanced and accurate information available on WordPerfect's styles and on ways to create documents that can act as templates. It reports little-known problems in WordPerfect's mail-merge, and it's the only book on the market that describes the enhancements to the macro language in the interim release numbered WordPerfect, Version 6.0a.

The material in other WordPerfect books overlaps that of the manual. *WordPerfect 6 Power Tools* covers material that the WordPerfect manual's writers never even dreamed about.

• **Using WordPerfect 6, Special Edition**, by Que Development Group, \$29.95. Que, 800-528-4331. ISBN: 1-56529-351-7.

Circle 441 on reader service card

• **WordPerfect 6 Power Tools: Macros, Templates, and More**, by Gordon McComb, \$40.00. Random House Electronic Publishing, 800-733-3000. ISBN: 0-679-75156-4.

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Read Only Recommends

Some useful ideas for those times when everything really is black and white. *The Gray Book*, by Michael Gosney, John Odam, and Jim Benson, \$24.95. Ventana Press, 800-743-5369. ISBN: 1-56604-073-6.

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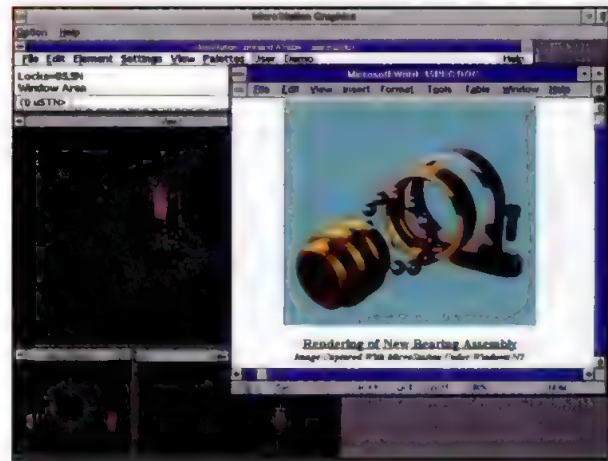
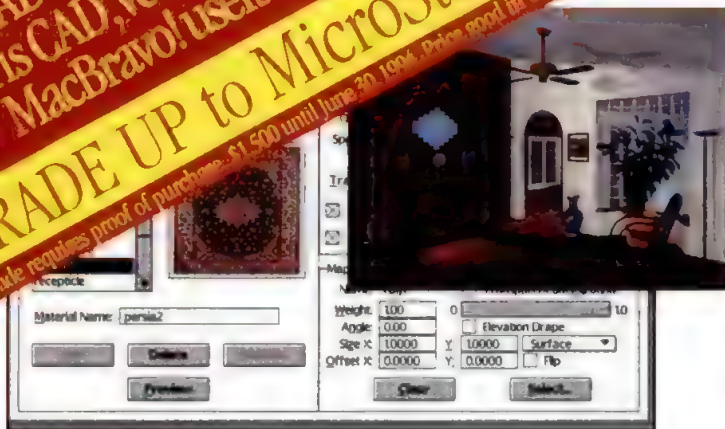
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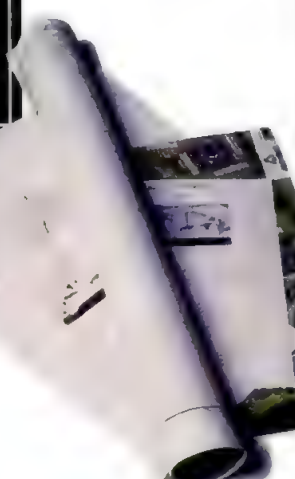
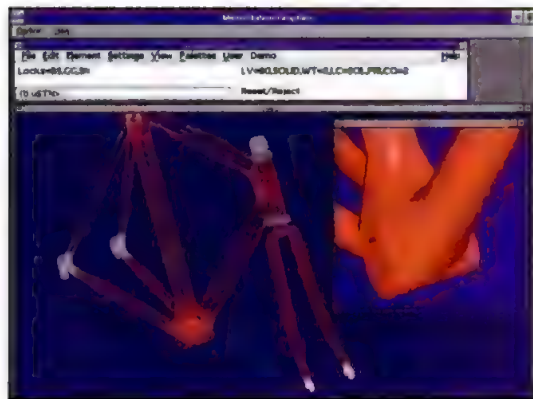
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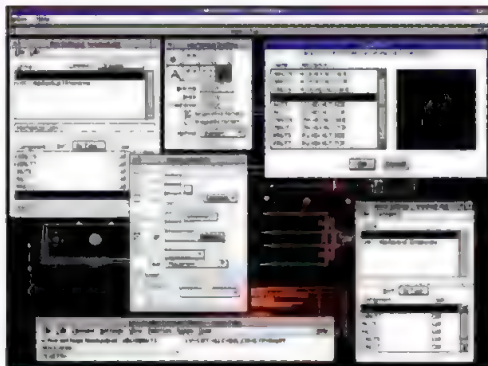
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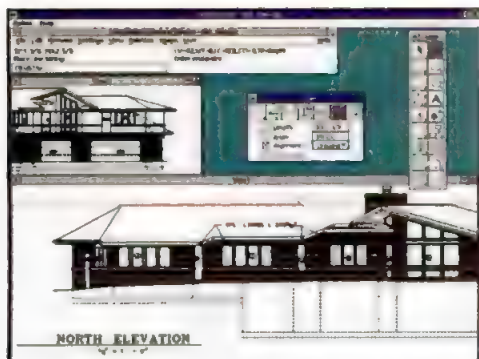
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Usability. What does computer-aided drafting have to do with the way you think? Everything. MicroStation software works for you. It understands the drafting process so well that it infers what you'll do next.

Graphical User Interface.

MicroStation's easy-to-use interface includes pull-down menus, dialog boxes, tear-off tool palettes, and tool settings window. Choose your interface — Windows or Motif — on any platform. **Transparent Modeless Operation.** The software supports the way you naturally work, maintain-

ing command execution while you fine tune: change element attributes or command parameters, manipulate views, change the dimensioning system, and more.

Powerful View Manipulation. MicroStation supports up to eight active views that can be moved, sized, and overlapped to fit your design. Zoom and area at any scale. Move around your design fast with built-in dynamic panning.

Workspace Editor. Tailor pull-down menus, dialog boxes, and tool palettes — even disable commands — with a graphically oriented toolset for customizing your chosen interface. **Text Capabilities.** A convenient text editor lets you easily edit single-

line or paragraph text. Choose from TrueType, PostScript, AutoCAD SHX, and MicroStation fonts. ASCII text files can be imported and exported. **Multiple**

Undo/Redo Commands. Undo mistakes and perform "what-if" designs in a flash with unlimited undo and redo. **Plotting.** Plot raster and vec-

tor information by view or defined areas, at any scale. Visually preview the plot before plotting, saving time and materials. **Online HELP.** MicroStation's

HELP remains active, tracking the command you're currently using, so there's no searching through manuals for assistance.

Associative Patterning and Hatching.

Associate patterning with graphics. Change graphics and the patterning updates. Flood-fill hatching/patterning

intelligently fills an area, detecting boundaries and holes with a single pick. **Associative**

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with the geometry, not with a point in space, so that when you change

the geometry, the dimensions automatically update. **Custom Line Styles.**

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Michael J. Miller

A More Perfect Union

By now, you've undoubtedly heard much of the hype surrounding application integration and software suites. These programs are working better together, and in the long run, technologies such as Object Linking and Embedding (OLE) and

OpenDoc will lead us to a document-centric world of software. In this new world, we will think about creating documents using multiple tools and not about using multiple applications.

It all sounds good, and in general I believe it (see our cover story). The move to compound documents and applications that can be used within other applications is a big step forward, one that is potentially bigger and more difficult than the shift from character-oriented software to a graphical user interface.

There is one thing we need to recognize, however. This really isn't new.

In fact, people have been talking about software suites for almost as long as there has been productivity software. Does anyone remember the old collection of PFS:File, PFS:Report, and PFS:Write, back in the days when PFS was Software Publishing Corp.'s brand name? How about CalcStar and DataStar, touted as the perfect companions for WordStar? More recently, how about PlanPerfect and DataPerfect from the folks who brought you WordPerfect?

APPS IN A BOX

Putting it all together in one box isn't new either. Remember integrated software—collections of programs such as Open Access or Enable—or all-in-one programs such as Symphony or Framework? They did okay business for a while, but they certainly didn't change the course of software.

Of course, even now we're seeing renewed interest in packages such as Claris Works, Microsoft Works, and WordPerfect Works. These were once called "low-end integrated software," but now I'm hearing people call them

"entry-level suites." Isn't it wonderful what marketing can do?

Nevertheless, some of the latest entrants in the low-end-integrated-software product derby have more in common with the powerful software suites than they do with the integrated applications of old. They are actually a bit like suites with training wheels. Microsoft Works for Windows 3.0, for example, uses OLE 2.0 to drag-and-drop objects to and from your document. And the new Claris Works applies all of its tools to one master document, mimicking the document-centric approach of the big boys.

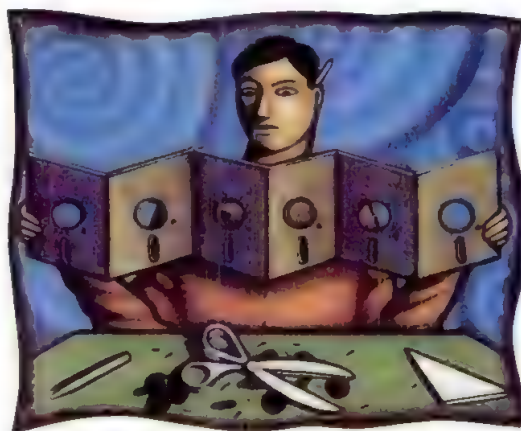
Similarly, the idea of accessing one program while you're in another program has also been around for quite a while. Add-in programs for Lotus 1-2-3 and WordPerfect were very common in the days when people essentially "lived" in only one computer application. I can remember word processors that plugged into Lotus 1-2-3.

MULTITASKERS

So what is new here? The biggest thing that's happened, of course, is that most of us are now working in multi-

tasking environments that let us switch easily among several different programs. This makes it more likely that we'll want more and more programs. The software developers have noticed this and have responded by packaging their applications together.

After all, Lotus realizes that if people are going to buy 1-2-3 anyway, it can be good business to sell them AmiPro and other applications at a good price rather than having them buy WordPerfect. Lotus may not get as much money for each piece of the suite, but overall it gets more money



Application suites, integrated software: The future's looking good, but it's also looking familiar.

Michael J. Miller

from each customer. Well, at least that's its theory. That's why we're now seeing suites that are composed of the best-selling individual applications.

Another thing that is happening is that as we run more applications and switch between them, we become more aware of the differences among these applications—many of which are different for no good reason. That's why we are seeing such a push for consistency among applications, at least applications that come from the same vendor. Personally, I run a lot of software, so I'd like to see even more consistency. Maybe someone could publish a set of common icons for such things as file opening, closing, saving, and printing that all the vendors could share. (Does anyone really think there's that much competitive advantage between different file open and save icons in all of these programs?) Of course, we need to be careful here: Consistency is important, but we have to leave room for improvements in user interfaces. I still believe soft-

ware can and will become a whole lot easier to learn and use.

The other big change in application integration is the underlying technology. Integration between different applications used to be a matter of import and export filters and programs reading each other's files. Now we have a common Clipboard, so cutting and pasting between applications is not only possible, it has become commonplace.

COMPOUNDERS

Consider: We recently surveyed ZiffNet users who run application suites. More than 40 percent of the respondents said that they create compound documents "frequently," and 40 percent said that they create compound documents "occasionally." Now, it's true that these respondents are likelier to use more software more heavily than average users. Most of these compound documents are probably created the old-fashioned way, using cut, copy, paste, and the Clipboard.

But the point is that there's a terrific demand to create documents using multiple sets of tools, and this is before OLE 2.0—or OpenDoc-based applications are even out there. When such applications become wide-

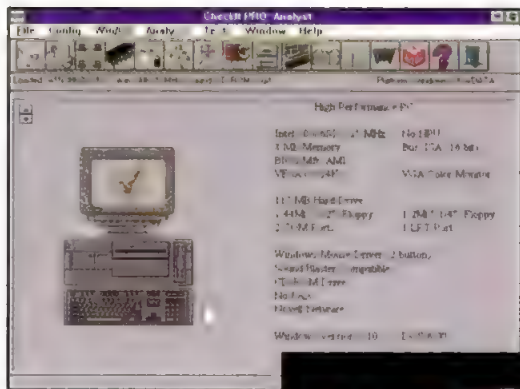
ly available, I expect that common documents will simply become another way of working.

There are all sorts of new application components we're starting to see. If you don't like the drawing part of your application, you should be able to pick a different kind of drawing component, such as Shapeware Corp.'s Visio 2.0. If you want to manage or edit an image in your document, you should be able to pick the appropriate tool, such as Watermark's image editor. (Professional artists will obviously pick different tools.) If you want to view a file from another program, you should be able to use something like System Compatibility Corp.'s Outside In for Windows. More to the point, I think we'll see many more vertical tools, or *objects*, such as those specifically designed for doctors, lawyers, dentists, and so on.

It's all a big change in the way we look at software, and yet it isn't all that strange. We've wanted to work this way for a long time. It's just that now, for the first time, application vendors actually have the tools they need to provide us with real document-centric application integration. Perhaps this new world is more familiar than you may think. □

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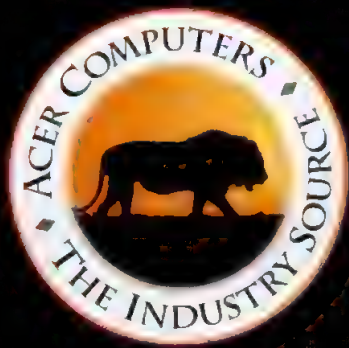
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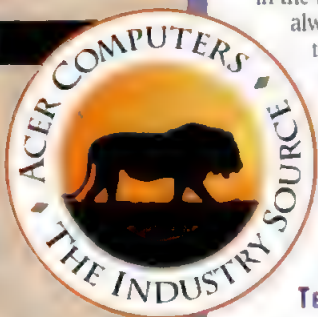
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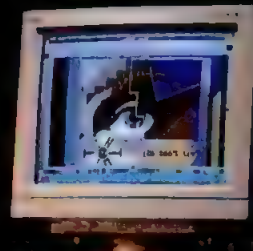


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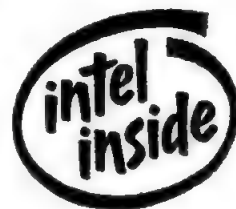
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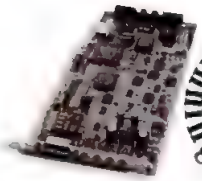
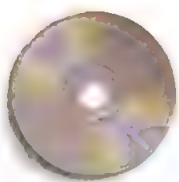
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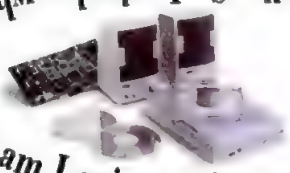
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Bill Machrone

Only the Paranoid Survive

The hottest emergent category at the Fall Comdex trade show in Las Vegas was desktop video. A number of booths, including our own, had screens with ragged, pixelated faces staring at you. In the Ziff booth, you could get a live video tour of ZD

Labs in Foster City, California. I'm still not a believer in desktop videoconferencing, but I'm willing to be convinced. The sheer number of companies trying to get into this market indicates that there's something here. Could they all be misguided? Companies are lining up to beat each other's brains in, with no indication that users are willing to spend \$2,000 per station for the dubious privilege of seeing a poor-quality picture of their business associates while talking to them.

Andy Grove, Intel's CEO, says I'm wrong about this. He says that videoconferencing is not an end in itself. Conferencing, according to Andy, is the real point, and video enhances it. Andy is very hung up on desktop video in general and videoconferencing in particular. He differentiates between videoconferencing and video-enhanced conversation. At the heart of the video part of conferencing, as with face-to-face conversation, are the nonverbal cues. Video makes conversation more efficient. A video phone call, says Andy, is not conferencing. Discussion over a document is. He's setting the stage, of course, for true collaborative computing, where you share applications across the wire just as naturally as you and your associates would noodle over a notepad full of numbers, words, and sketches.

Shared-screen applications are in the future, but the future is not here yet. I've spent time with some of the early shared-screen apps, and they're simultaneously exciting and frustrating. It's great to say to your associate, "Let's try it this way," as you grab a hunk of text, change the typeface, and bold it. The changes appear on her screen moments after they appear on yours, but she may be fuming because you snatched the cursor out of her hand just as she was about to make a change.

Likewise, you may be using the mouse in your conference room to point out an area of a shared document to someone else in the room. Suddenly the pointer skitters off in some other direction as people in another location, working "collaboratively" with you, decide to make a change. Audio and video links may reduce the blood pressure spikes, but clearly a whole new etiquette has to emerge before collaborative computing will succeed.

EXCEPTION TO THE RULE

Videoconferencing's proponents talk earnestly about the importance of nonverbal cues. I'm here to tell you that you'd better send some verbal cues with most of these systems or the receivers at the other end won't even know who you are, much less what you're feeling. After the compression and decompression algorithms have had their way with your image, your eyebrows are represented by half a dozen blocks of color. A block or two down, there's another blur where your eyes should be. Almost all these systems digitize and compress the video signal so that it can fit down a narrow path, typically the 128 kilobits per second of the two B channels (64 Kbps each) of an ISDN call.

Likewise, if the call is staying in the building, you still want it to be highly compressed. All it takes is half a dozen video conversations to saturate a 10- or 16-megabit-per-second network connection. Video has to take priority on the LAN or the picture falls apart. If you move, it takes an appreciable amount of time before the system figures out where all those pixels went and rearranges them into a simulacrum of your face on the receiving end. In addition, the frame rate of these videoconferencing systems seldom goes above 15 frames per sec-



Good idea or not, video conferencing is creating a big stir.

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Bill Machrone

ond. That means major flicker. People in motion look as if they've been caught in the act by a security camera. The algorithms keep getting better, but for now the picture is lousy.

One exception is C-Phone. Twincom, located in Wilmington, North Carolina, is a manufacturer of low-cost modems. The company has entered the video teleconferencing fray with a system that dispenses with most of the limitations of digital systems. C-Phone is analog and uses a full NTSC signal (the same standard that governs broadcast television) for its sound and picture. The images produced by C-Phone are crisp, and there's no blur or flicker. Analog sounds almost heretical in this day of digital everything, but you can't argue with the quality. C-Phone can carry up to 64 channels of images, 32 simultaneous two-way conversations. It also lets you broadcast meetings or training tapes to any number of stations on the LAN with no effect on other conversations or on overall system performance.

Twincom president Dan Flohr emphasizes that C-Phone has a narrow goal: to make high-quality video phone calls. You'll get your shared-screen applications from other vendors. C-Phone's only limitation is that it works only over coaxial cable. You're out of luck if you've got twisted-pair, but C-Phone's clear, television-quality images and sound may impel you to rethink your existing wiring plan if you have a need for face-to-face computing. Once you go off the network, C-Phone then faces the same bandwidth limitations as every other system. If you have a full or fractional T-1 line between sites and an expensive codec, you can get a decent image. Otherwise, it's back to blurry pixels.

C-Phone caused a stir among the other vendors at Comdex. Andy Grove went to the booth for a demo, grilled Dan Flohr for 20 minutes, and left with a grin, saying, "Only the paranoid survive." IBM's Jim Cannavino also came by, all smiles and affirmation while three lieutenants took notes and did their best to peek around the backs of the machines to see how they work. Twincom is keeping mum for now about the technology and has applied for patents, but it's obviously bucking the tide and will probably be seriously dissed by the other vendors for having the temerity to try something new. □

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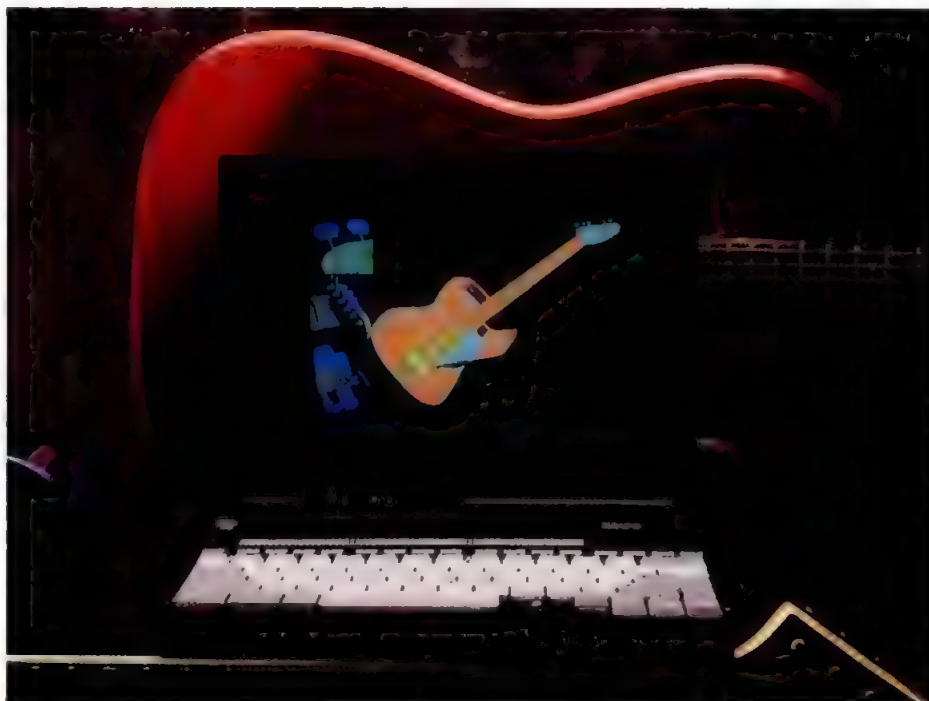
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CIRCLE 036 ON READER SERVICE CARD



John C. Dvorak

Comdex Lament

I didn't go to Fall Comdex in Las Vegas this past November. I figured there was nothing at the industry's largest annual trade show that I hadn't seen already. And I knew it would be too crowded and nothing but a big hassle. Instead I went to the

Foothill College record swap meet in Los Alto Hills, where I could find some new additions to my collection of 1950s doo-wop music. This turned out to be a much better use of my time.

That's the opening paragraph I wish I could have written. In fact, I did go to Comdex, and I missed the swap meet. Big mistake.

Comdex has matured and found itself, but what it's found is pretty dull. It's largely unimportant for those of us who write about computers. There are few new products because the pressures of today's market don't allow companies to sit on products until November. And as a schmooze-fest, Comdex fails miserably.

Vegas has decided to expand massively so that it can accommodate both gamblers and trade shows. The result is a mess. Traffic is terrible, and the hotels are packed with a mix of old ladies who play dollar slots until four in the morning, slicksters on the make, gold diggers, and the 170,000 goofy showgoers.

Believe me, Spring Comdex, PC Expo, and the Software Publishers Association conference are much better places to schmooze. The Fall Comdex party scene is still good, but there are too many rah-rah sales geeks. My impression was that most of the people at Comdex were third-tier. Any smart money at the show came for just a moment and then left in a hurry. The mix of business and pleasure plus the intense 24-hour gambling and boozing mania just doesn't work.

It's gotten so bad that some of the side events are bordering on the ludicrous. One company was sending up people in stunt planes for mock dogfights. Another company rented the nearby speedway so that you could zoom around the track in 650-horsepower Trans Ams. There were balloon

rides, tennis tournaments, dances, and trips to Hoover Dam. It's ridiculous.

This is all leading up to my excuse for bagging the show next year. It's simply redundant.

Interestingly, the foreign contingent was more prevalent than ever. Everywhere you looked you saw characters with strange haircuts and funny suits smoking cigarettes—clueless, trying to catch up with the technology. As the overseas markets bloom, even more foreigners will come to Comdex. The trade shows outside of the U.S. are important to them, but this is the mother ship, and a Comdex in Singapore or Buenos Aires is not the same as Fall Comdex in Las Vegas. So they flock in. They catch up with things as best they can and then lose track in about six months. By next year, they'll nervously flock back looking for a new fix. This group will keep Comdex alive forever or until the exhibitors begin to notice that most of these people are tire kickers, small-time wannabes, and junketeers.

Another group of attendees that will continue to frequent the show are sales reps who do deals with other companies. Meetings, meetings, and more meetings. "We'll get together on that OEM agreement right after the show, Jim."

I'm still uncertain how many dealers, if any, really attend the show any more. The small-timers go to Computex in Taiwan, and the big chains have their own mega-events where they do deals. I suppose that many come to the show just to make sure there are no surprises in the issue of *PC Week* that comes out right after the show.

As an executive from Compaq told me, "We don't do Comdex anymore. We already have dealers." He was there to see if there were any surprises.

There were no surprises.



This year I'm bagging Comdex. It fails miserably as a schmooze-fest, the traffic is terrible, and there are no surprises.

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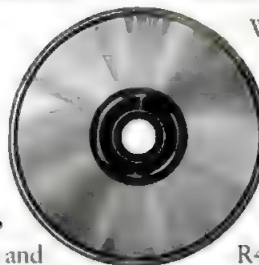
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Inside Track

N

ot Seen at Comdex Dept.: The **best-kept secret** at Comdex was the DX2 Pentium—a chip Intel is rumored to be readying for release in the second quarter. This is a clock-doubled 60-MHz chip and will be sold as a **120-MHz chip**. It's considered by company

insiders to be the **PowerPC killer**. People familiar with the chip say that it will produce 80 MIPS of power. Interestingly enough, this chip will be manufactured using the 0.8-micron process, which seems to be working better and better. The company will move to the 0.6-micron Pentium as soon as it can. The smaller traces mean that the chip is smaller and produces less heat.

In the meantime, we'll continue to see these big ol' chips. More **good news**: I'm told by motherboard makers that the 66-MHz chip seems to be working finally.

Intel is **in a bind** about the 120-MHz Pentium as well as the upcoming line of 0.6-micron chips, which will be released at 80 and 100 MHz. The bind has to do with the **screwy PCI "local" bus** invented by Intel. This thing is designed to run with 33-MHz chips for some odd reason, and systems designers are grouching about this **slow speed**. The newest specification for the VESA VL-Bus has it running at 66 MHz. "If Intel doesn't do something, then the VESA VL-Bus will win the game by default," an engineer told me. **Early bugs in the PCI design** haven't helped the situation either. And the video chips that are compatible with the PCI system are just now coming out. None of this looks good for PCI.

PowerPC Jinx Afoot?: A Taiwanese group calling itself the New PC Consortium has decided to support the PowerPC chip and the upcoming Personal Power Systems. The group is led by Mitac—one of the few PC-clone makers that actually produced a PC clone using the **Micro Channel architecture**. Oooops.

Scaring the Dumb Customer Dept.: As Cyrix makes hay with its **nifty clock-doubled single-chip** add-on upgrades for old 386 machines, a number of clone makers (one in particular) tell customers that the chip will "blow up the computer—better to buy a new computer!" Make them **prove it**. And please document these reports and send me copies. It might make for some interesting reading. Cyrix has added a nice SX upgrade chip to its line of cheap upgrade solutions. Priced at under \$300, the upgrade will nearly double the performance of that creaky old

*The best-kept secret
at Comdex was Intel's
DX2 Pentium chip. This
is a clock-doubled 60-MHz
chip and will be sold
as a 120-MHz chip. It's
considered by company
insiders to be the
PowerPC killer.*

386SX a few of you still use. Coming up next: **an upgrade for notebooks**. In my opinion, this product is an excellent idea.

In Still More Back Rooms Dept.: Now it appears that Sony, Mitsumi, and Philips will announce shortly an **IDE version of a CD-ROM drive**. All three companies (and I assume others) showed their drives at secret Comdex hospitality suites. Systems designers will **eat these things** up. If you can toss out the need for SCSI circuits in a system, the computer can be even cheaper.

Now I've Heard Everything Dept.: Why the network news doesn't jump on stories like this shocks me. According to the international news service Agence

France-Presse, an Israeli man filed to get a divorce from his wife because **she was having an "affair"** with an **x-rated** computer game. She was dubbed by a Tel Aviv court a "theoretical adulteress" and the court apparently decided to grant the man a divorce. Oh, brother.

Information You Can Use Dept.: Reader John Coxen clued me in about this interesting U.S. government-funded corporation that few people know about. It's called the **National Technology Transfer Center (NTTC)**. Located at the Wheeling Jesuit College (Wheeling, West Virginia), it was established by Congress to strengthen the competitiveness of American industry. If you need access to a federally developed technology, then this is the place to go. The Center also serves as the **hub** for the National Technology Transfer Network, which includes the NASA Regional Technology Transfer Centers and the Federal Laboratory Consortium.

For starters, there's an 800 number that helps you get linked to experts from **700 different federal labs**. For more information, call the NTTC at 800-922-2820. The Center also coordinates an on-line service called Business Gold.

Traveling Too Much? Dept.: As we go into a new year filled with more shows and conferences, we have to wonder if we're traveling too much. **Answer yes** to any of the following questions **and you definitely need to take a break**. (1) When at home, do you dial 9 before making a call? (2) Do you wake up unsure about what town you're in? (3) Have you stopped taking home little bottles of shampoo? (4) Do you keep talking about "the city you were in recently" and never remembering what city it was? (5) Do you think you are living it up when you see a big full-size bar of bath soap? □

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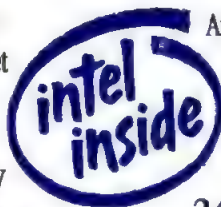
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Jim Seymour

Good Interfaces: Rich or Spare?

We've learned a lot over the past few years about the performance overhead of GUIs, or graphical user interfaces. Technology, in the form of graphics accelerator chips, roared to the rescue.

Now a GUI overhead problem of another sort is raising its nasty head. And hardware can't fix this one.

You have to push a lot of pixels around the screen with a GUI, and the better the GUI gets, the *more* of them you have to push around. Move up from VGA resolution (640-by-480) to Super VGA (800-by-600) or 1,024-by-768, and you have a lot more pixels to redraw. If you're also moving from the basic VGA standard's 16-color palette to 256, 32,000, or 16.7 million colors—and I hope you are—by the time you reach those more-or-less true-color levels, you're hip-deep in display computations.

So Weitek Corp., Tseng Laboratories, ATI Technologies, Matrox Electronic Systems, S3, and a few other manufacturers rode to our rescue, with fast hardware for driving those big, multihued SVGA displays.

But now that we're redrawing those GUI screens so nicely, we need to start thinking about how those graphical interfaces are designed. Because we're running out of screen real estate.

GUIs drove us to larger monitors, from 14 inches to 15 and perhaps soon to 17 inches as standard, or even up to 19 to 21 inches for users with big wallets and bigger desks. We could run at higher resolutions with bigger windows for our applications, more windows open at once, or both. That was important not only so we could enjoy a what-you-see-is-pretty-close-to-what-you'll-get view of our documents, but also because Windows applications started using that GUI workspace with abandon.

Add to Windows' scroll bars and header bars the apps' own button bars, rulers, tool strips, formatting ribbons, status bars, floating palettes, and the rest of the program's over-

head, and you've used up a lot of screen real estate.

Then add the graphical devices that developers use to bridge the old world of paper, pencils, and notebooks and the new computer world of screen, keyboard, and mouse, and pretty soon you wind up with very little space left on the screen for your data.

MAKE ROOM FOR DATA

When we first bought bigger monitors and drove them at higher resolutions, these problems were manageable. But now, with many workers trading in their desktop PCs for notebook machines—not just as adjuncts to desktops, but as their sole computers—this problem of cluttered, or at least very *busy*, interfaces is coming to a head.

To make things even worse, the smaller displays on notebooks—from about 7.5 inches to a (rare) 10.5-inch maximum—run at only VGA resolution. So not only must we deal with displays that are small in an absolute sense, but we must deal with the confines of a 640-by-480-pixel maximum window size.

And a lot of today's best Windows apps are tough to deal with at that size.

I don't want to sound like an interface Luddite: I admire software developers' clever use of graphical environments to simulate, or at least subconsciously remind me of, my traditional desktop working environment. But eventually we begin to approach a point of diminishing returns in using GUIs to simulate the way we used to work, rather than to scoot us along into the digital age.

Example: Lotus Organizer, one of my favorite apps. It shows a six-ring binder, open to today's date in an appointment book. I can flip to tabbed calendar pages, to-do pages, a notebook where I can paste things I need to use again



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must take screen real estate and other
realities into account.*

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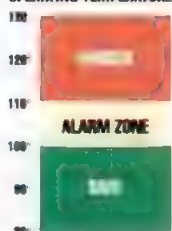
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Jim Seymour

and again, and a contact-manager-style name-and-address section. Tools to the left side of the binder let me do the usual personal-information-manager tricks.

I like Organizer, and much of what I like about it is that graphical representation of a familiar, Filofax-style daybook.

But the program uses up a lot of screen real estate in its effort to be cuddly and familiar. The space left over for the details of my appointments is a small fraction of the window in which it runs: The rest is consumed by the ring binder, tabs, wastebasket (which bursts into flames when items are discarded), button bar, menu strip, tool palette, digital clock and tear-off-style calendar pad.

WHAT'S A USEFUL WINDOW?

I used to keep Organizer running in the smallest possible window—about 500 by 350 pixels—in the corner of my desktop system's 17-inch, 800-by-600 display. But I soon realized that I always ran it up to full-screen size to actually use it, because at 500-by-350 it was unreadable, or too little information was shown to be useful.

So I now keep Organizer running full-screen, reducing it to an icon when I'm not actually using it. On notebooks, of course—where, arguably, I most need my schedule, to-do lists, and phone book readily available—I have no choice: I have to use it in the pinched 640-by-480 view.

Barbara Baird, the Organizer product manager at Lotus, and the programmers who keep evolving the program are thoughtful people, well aware of the problems of packing a rich user interface into a 640-by-480 display. Organizer already neatly reconfigures itself as you change the size of its window, to give you more data and greater readability.

But these folks work in a world of limits: 640-by-480 at one extreme, our expectations at the other.

I'm not eager to give up what I like best about Organizer: that familiar interface. But I suspect that we're now seeing the last generation of PC applications that try so hard to capture the look and feel of the way we were, rather than insisting that we accept the new realities of screen, keyboard, and mouse.

I don't know what that Next-Generation interface will include, but I suspect that flaming wastebaskets won't make the cut.

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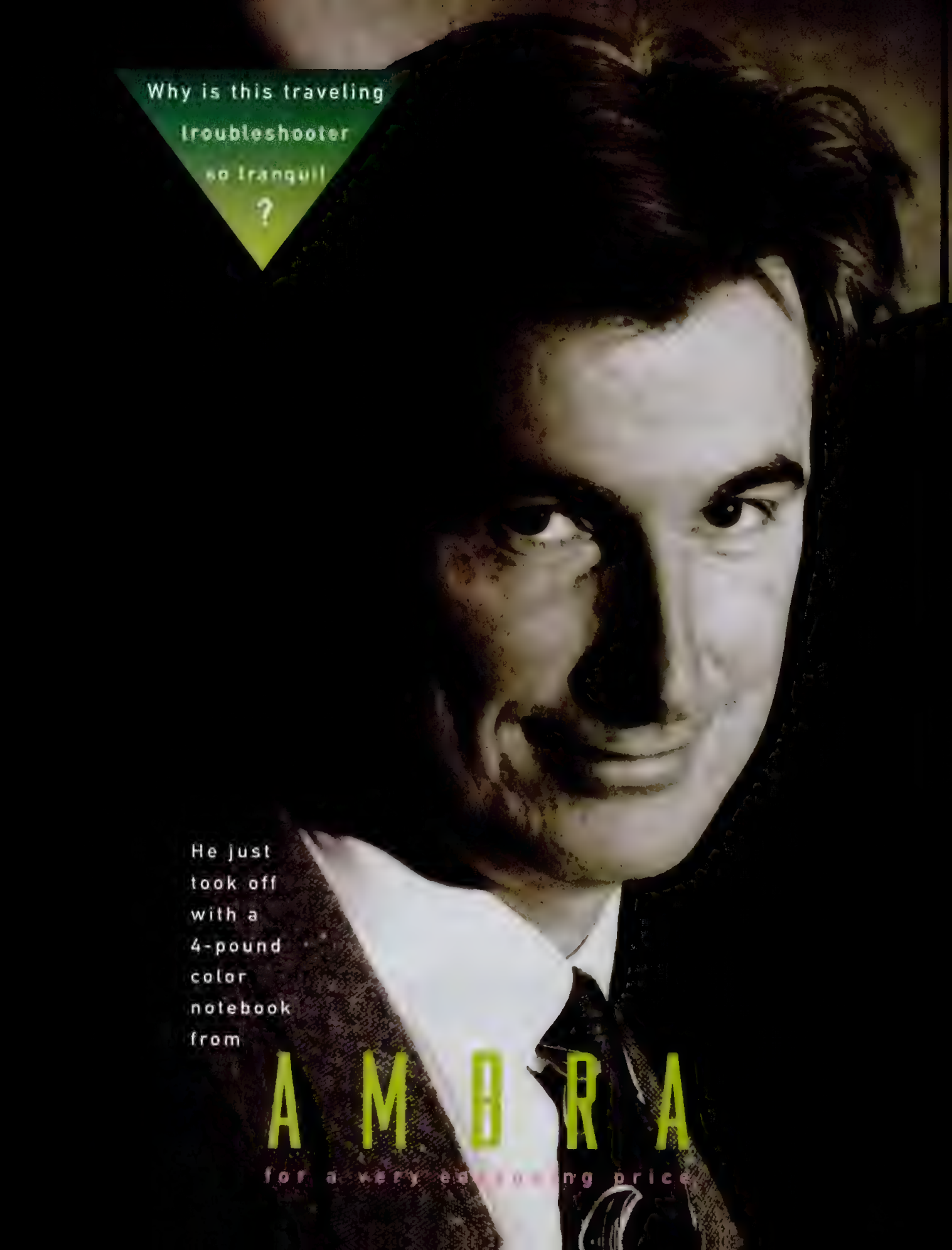
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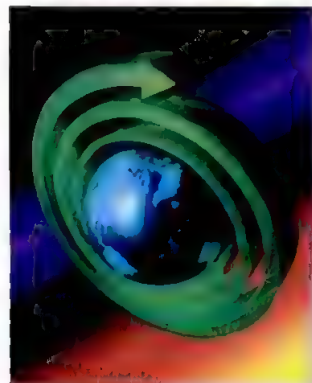


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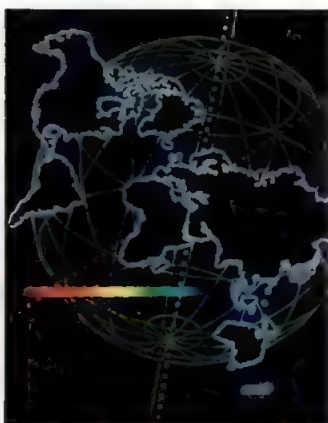
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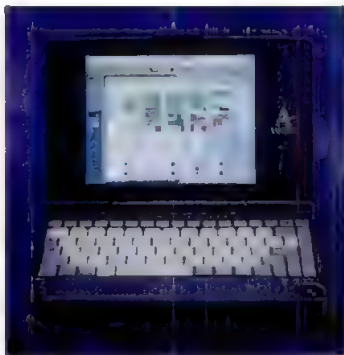
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Bill Howard

Comdex the Hard Way

Shifting through the offerings of 2,200 vendors at Fall Comdex, the PC industry's annual gathering of the clan in Las Vegas, you see patterns emerge. Here are three hardware trends that will happen and one that might.

DSPs are hot. Modems and sound boards are shifting from fixed-function chips to more versatile digital signal processors (DSPs). You'll also see DSPs speed up video boards, enable PC-based videoconferencing products, and control some of the cellular-phone/personal-organizer products you'll see competing with PDAs. Because none of the programming is hardwired in, DSP-based products are infinitely upgradable. Find a bug in the sound board? Want to upgrade the modem from 9,600 to 14,400 to 19,200 bps? Want to add fax? Just download a new version of the code to the DSP from a BBS or a floppy disk.

The implications: (1) DSPs, while not cheap, are so flexible they'll drive down board prices. (2) You'll see more two-in-one boards, such as modem plus sound and sound plus video.

Cheap videoconferencing gets closer to reality. For as little as \$4,000 per site plus the cost of the high-speed phone lines you'll get an acceptable picture that is worlds better than the cheap picture-phones being hustled in the consumer market. In addition to the live picture of the people at the other end, you can pan the camera to focus in on a paper document or a whiteboard, and you can share and mark up an on-screen document. Who's doing this: Acer America, Apple, AT&T, Creative Labs, IBM, PictureTel Corp., Peregrine Systems, and TwinCom Corp.

At least one vendor is working on shared workgroup document markup and commenting, plus voice, minus the video. If that sounds like a resurrection of the five-year-old vision of Wang Freestyle, you're right on target. But this time we're talking about a financially stable company, and with a price of \$1,000 to \$2,000 per user rather than \$10,000-plus.

The implications: (1) Finally, you don't have to be a billion-dollar company to implement videoconferencing. (2) Once you've gotten a taste of what the cheap stuff does, you may want to try to the more expensive versions. (3) You'll wind up using both, one for informal daily updates, the other for formal conferences (straighten that tie!).

Universal battery sizes. Duracell continues to push the concept of laptops and PDAs built around a half-dozen universal, interchangeable battery sizes. After a year of tub-thumping and visits to 60 notebook makers, Duracell has a firm commitment from one vendor, Compaq, and hints that others are actively interested. It's a no-lose situation for Duracell since its share of the portable-computer battery market is a big, fat zero.

The implications: (1) Replacement batteries will be for sale everywhere. (2) Business hotels and maybe long-haul aircraft will have rechargers (and loaner batteries) available. Maybe. (3) An end to the proliferation of transformer types.

Monster hard disks on desktop PCs. By mid-1994 the standard, power-user hard disk will gravitate upward from 340MB to 500MB or 600MB, and 1GB hard disks for individual users won't be uncommon. The mid-level

configuration will move from 200MB to 340MB. End-user prices are already below \$1 per megabyte for many 500MB-plus drives and are heading toward 75 cents.

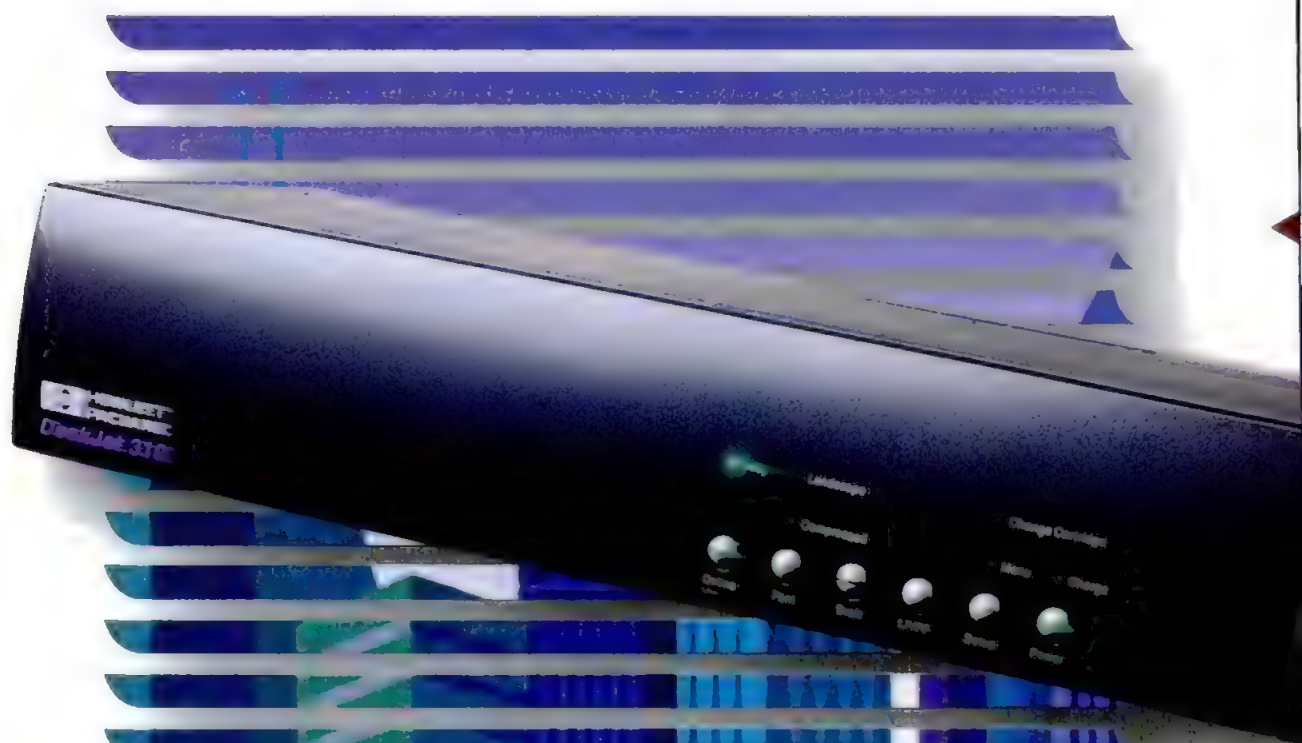
The implications: (1) Finally, you'll have enough storage space to do voice annotation of workgroup documents and almost enough space to dabble in video. (2) Friction between users who want control over their computers and IS managers who want to regain control. Who'll win? Sorry, IS: Once you let the genie out of the bottle, you can't put it back in. □



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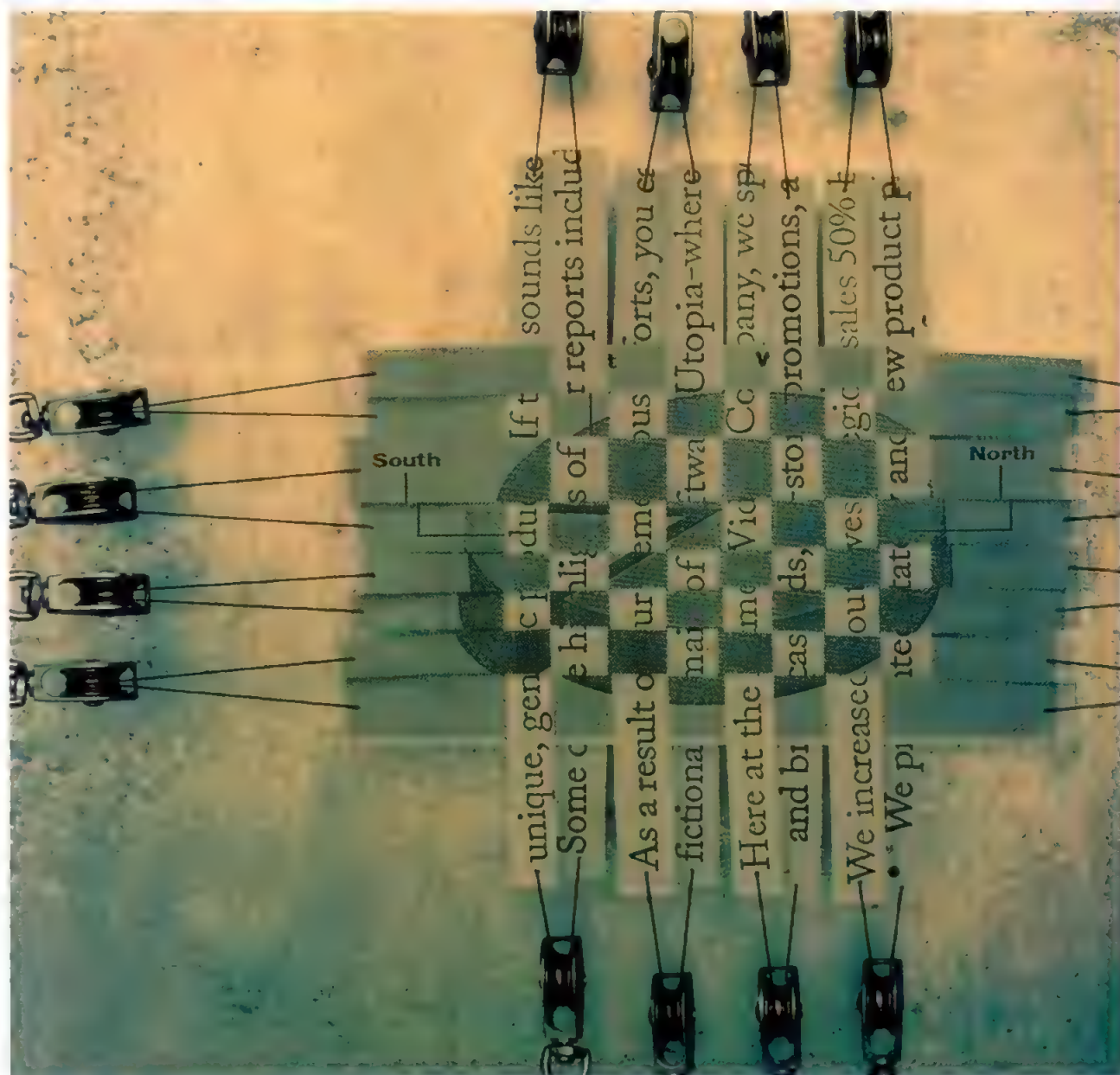
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APPLICATIONS INTEGRATION

Getting It



Together



The software industry has long paid lip service to the concept of PC applications working seamlessly together. But over the last few years, this talk meant little more than basic features like import and export filters or data exchange through the Windows Clipboard. When we last took an in-depth look at application integration ("Making Your Programs Work Together," March 30, 1993), there were a lot of theories and a lot of strategies promising to take us further—but not many products.

In less than a year, advances in operating systems, application software, and programming languages have dramatically changed the picture. Tools are coming into place for building seamless compound documents with a wide range of software, editing data objects in those documents with any appropriate application, and sharing data objects across a network. As these technologies come on-line, nothing less than our basic concepts of applications and the data they create are up for review.

CONVERGING TRENDS

One of the biggest reasons for improved integration comes from a very practical source: the sudden popularity of application suites. Suddenly, the pressure is on for vendors to

make the individual pieces—the word processors, the spreadsheets, the graphics programs, and the databases—share a common look and feel and work together smoothly.

More and more, we're seeing these suites being programmed as a collection of reusable objects or at least common components (for instance, a single charting engine or spell-checker used across a suite). Such shared pieces of code offer consistency for end users and make life easier for developers who only have to create each component once.

In another important trend, new integration standards from several vendors are moving from the drawing board to shrink-wrapped applications. In the past year, Microsoft has shipped its Object Linking and Embedding (OLE) 2.0 specification and implemented OLE 2.0 in a

Object-oriented models are revolutionizing our views of data, applications, and network communication.

by Michael J. Miller

series of apps. A competing standard, OpenDoc, has been proposed by vendors such as Apple, Borland, IBM, Novell, and WordPerfect. Other standards for connecting applications to electronic-mail systems, such as Microsoft's Mail API (MAPI) and Lotus and other vendors' Vendor-Independent Messaging (VIM), are gaining broad support. Similarly, both application developers and database-server developers are working on new ways of ensuring that all kinds of applications can access all sorts of data, wherever it is on the network.

We're also seeing an explosion of new macro languages, or cross-application control programs. These let you create scripts that combine and call on multiple individual applications to automate complex vertical tasks. Significantly, major software vendors are adding uniform macro languages to their application suites, while third-party offerings make it possible to integrate programs from different vendors. Object-linking standards like OLE 2.0 also let software *expose* (that is, make programmatically available) portions of its functionality that can be called by these languages.

The sum of all these developments—suites with shared code, new object-linking standards, better network connectivity, and cross-application macro languages—may change PC software use more than anything that's come before. From a world where our data "belonged" to standalone applications, we're moving to a world centered on what we're really interested in: documents.

In this report, we'll first survey the state of the art in applications integration and look at enabling technologies like OLE and OpenDoc that help apps work together. Then we'll review the leading suites—Borland Office for Windows, Version 2.0; Lotus SmartSuite for Windows, Release 2.1; and Microsoft Office Professional, Version 4.0—both as separate programs and as an integrated whole (see the article "Suite Deals" in this issue). We'll end with reviews of the leading macro languages for Windows and OS/2 (see the article "Cross-Application Macro Languages," also in this issue).

THE SUITE SPOT

Perhaps the most obvious form of application integration on the market today is found in suites, the bundles of applica-

tions offered by the major developers. Suites go back many years, but suddenly they've skyrocketed in popularity.

Microsoft reports that more than half of its Excel sales are through the Microsoft Office package (which includes Excel, PowerPoint, Mail, Word for Windows, and, optionally, Access). Lotus has made a major push for its SmartSuite combination (which includes Ami Pro for Windows, Freelance Graphics for Windows, Lotus 1-2-3 for Windows, Lotus Approach for Windows, and Lotus Organizer). And Borland and WordPerfect

For instance, word processors typically come with separate spell-checking, grammar-checking, thesaurus, drawing, and charting modules. These often existed as overlay files in DOS applications, but in graphical environments they are often implemented as a series of dynamic link libraries (DLLs). The logical thing to do is to share these components across a suite of products. Vendors only need to develop the functionality once, while end users enjoy the common look and feel. This can boost productivity and keep training and support costs down.

Current examples of shared resources include the common spelling engines now used in Microsoft's and Lotus's application suites. Another is the Database Desktop, a querying engine shared by Borland's Quattro Pro and Paradox.

OBJECT LINKING AND EMBEDDING

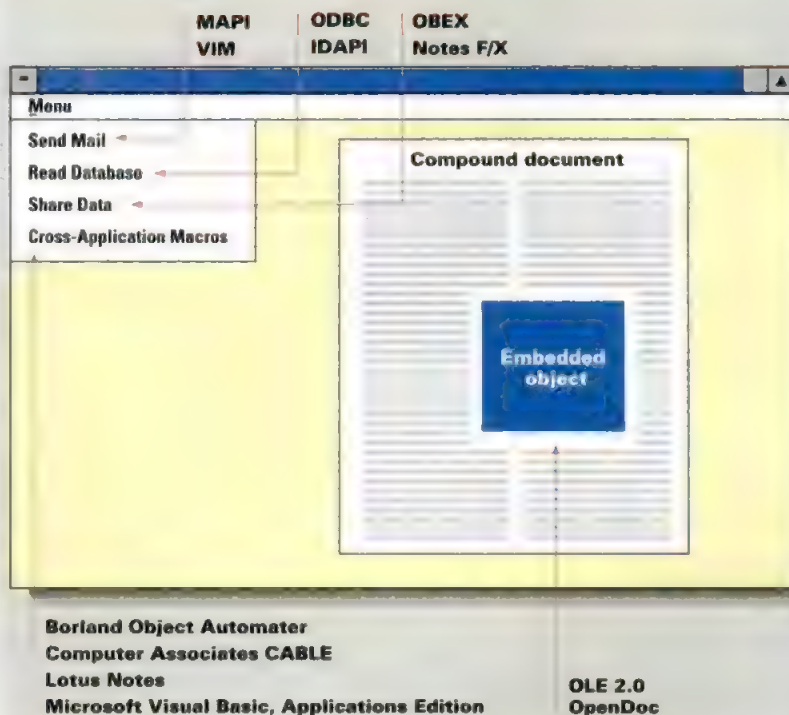
Another path toward better integration involves taking the object route. Many of the terms that you hear about objects—like encapsulation, inheritance, and binding—are of interest only to developers. But application users are about to come face to face with other ramifications

of objects: things like common objects in application suites, embedded OLE objects, shared objects on a network, and exposed, or programmable, objects in off-the-shelf software.

Probably the best known standard for integrating applications with object technology has been Microsoft's OLE, which first shipped with Windows 3.1 and found early support in applications such as Lotus Notes and Microsoft Excel.

OLE's goal was to let users place information created by one application inside a document created by another in such a way that the information could always be edited in the originating application. For

Applications Integration: Where the Action Is



have teamed up to create the Borland Office (including the workgroup editions of Paradox for Windows and Quattro Pro for Windows, and WordPerfect for Windows). Even in more specialized categories, suites are starting to proliferate. Aldus Corp., for example, has aired plans for a package to include FreeHand, PageMaker, and PhotoStyler.

As they become best-sellers, suites are also becoming more than bundles of unconnected programs. All the major vendors are well positioned to solidify the common elements across their suites, and they've been hard at work trying to provide a consistent user interface.

LOST IN A SEA OF CHOICES?





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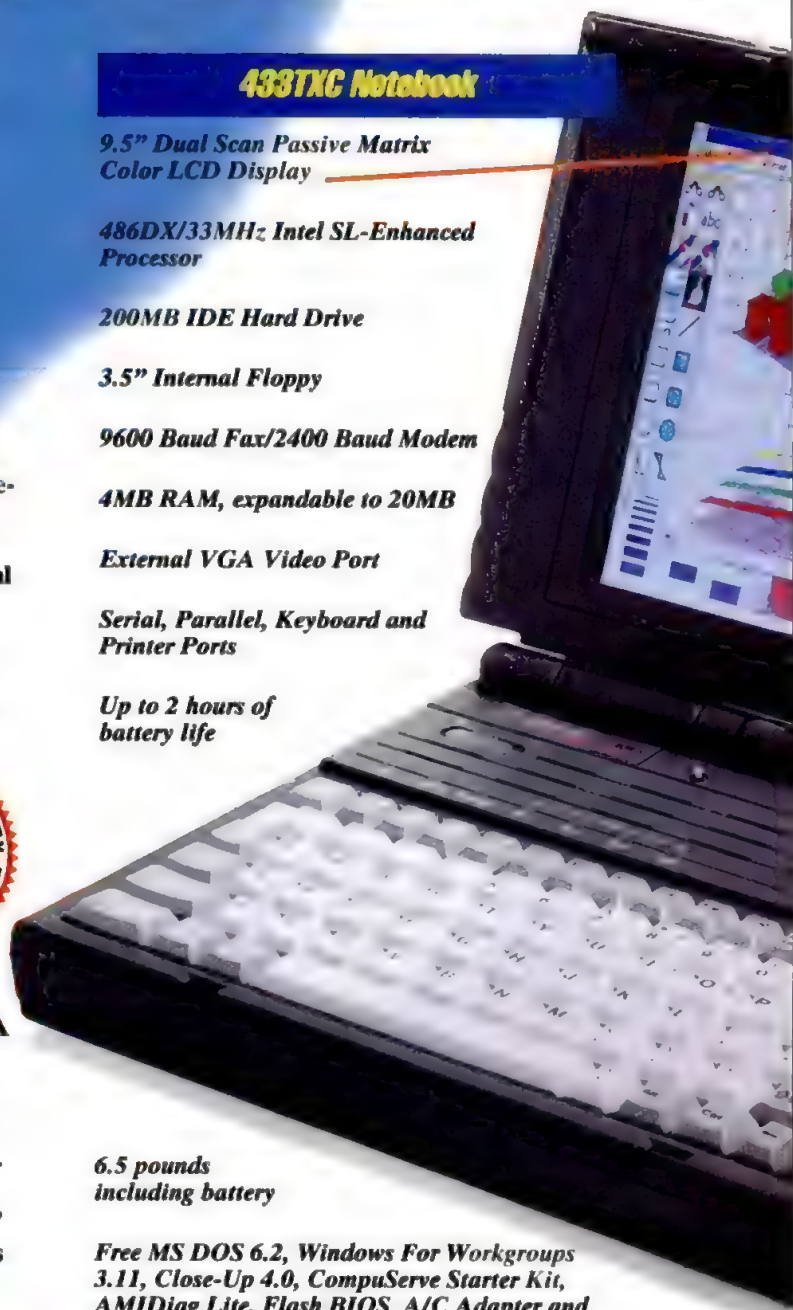
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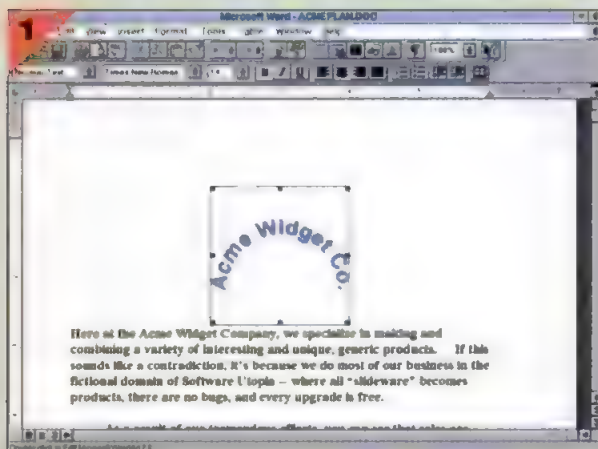
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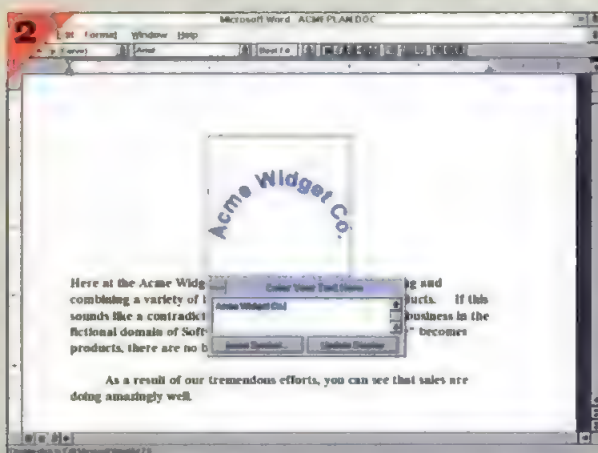
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OLE 2.0: Compound Documents

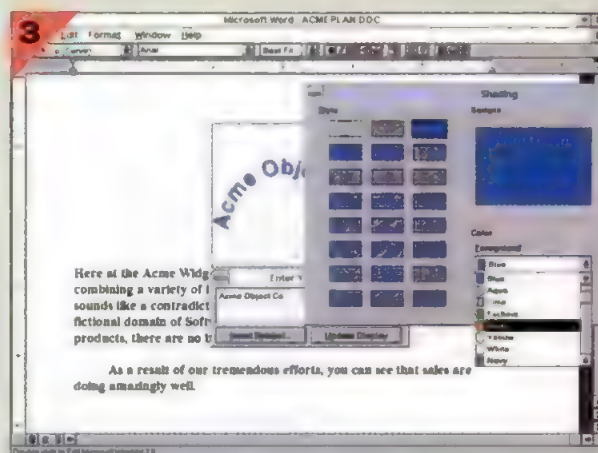
Applications that support Microsoft's OLE 2.0 standard let you build documents a whole new way: by assembling objects created in a variety of programs. The result: the compound document. Embedded OLE objects—which can be anything from a bitmap to a spreadsheet range—are always editable by the application that created them. The twist is that you don't have to leave the context of your document to do it. Here, we'll use OLE 2.0 to build a marketing plan for a fictional software company using Microsoft Word for Windows 6.0, Microsoft Excel 5.0, and Shawware's Visio, Version 2.0.



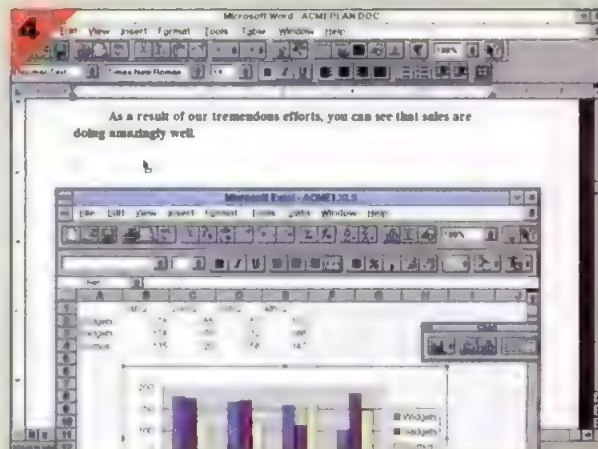
Starting in a Word document, we've created the logo using WordArt 2.0, an application bundled with Word.



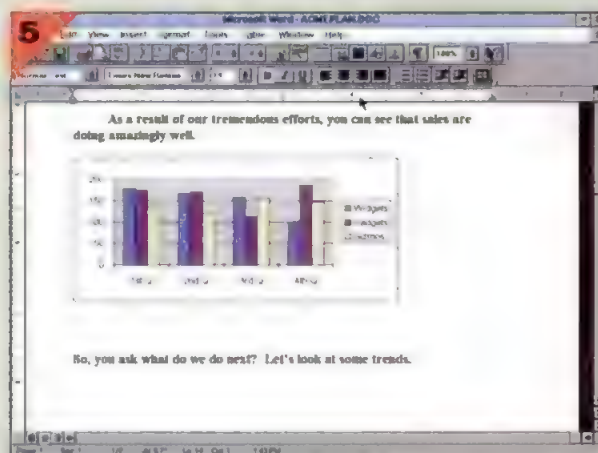
Double-clicking on the object brings up WordArt for in-place editing. Top menus and toolbars now belong to WordArt.



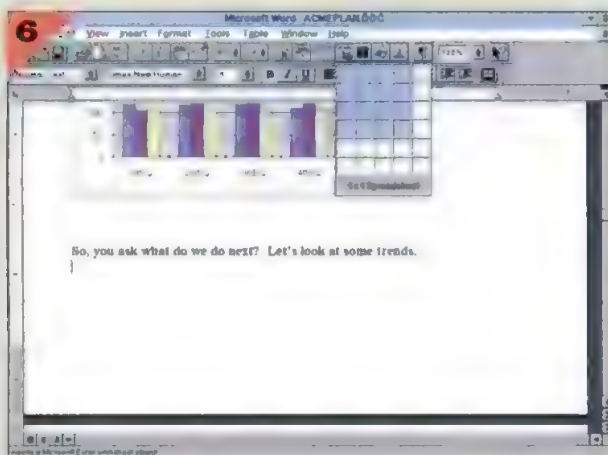
You can now use WordArt to edit the object. We've changed the name of the company and the color of the text.



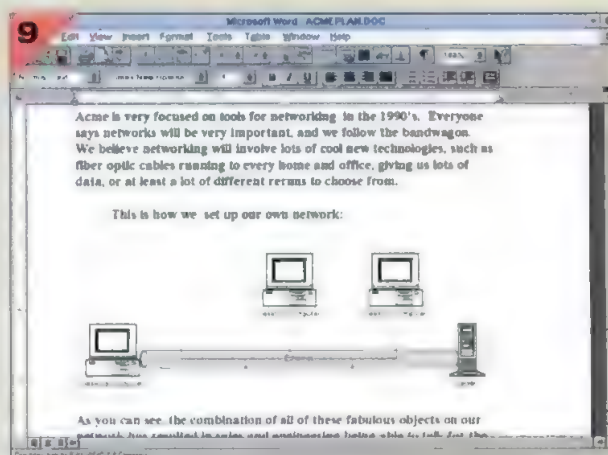
We might want to import information. Here, we've brought up an Excel graph, which can be dragged and dropped into Word.



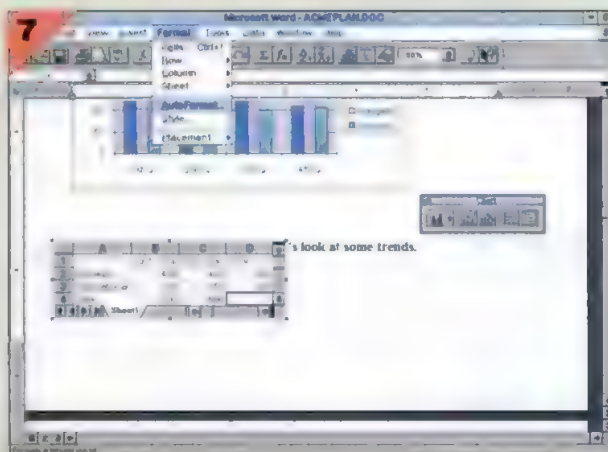
The result is an Excel graph that resides within a Word document as an OLE 2.0 object.



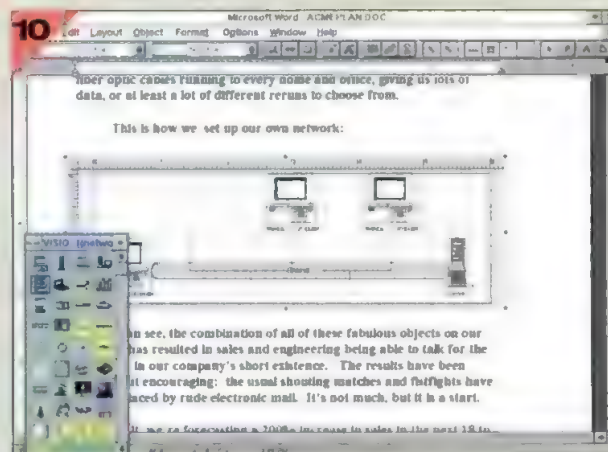
Word and Excel have some built-in integration. The Table function in Word lets you embed a sized Excel spreadsheet.



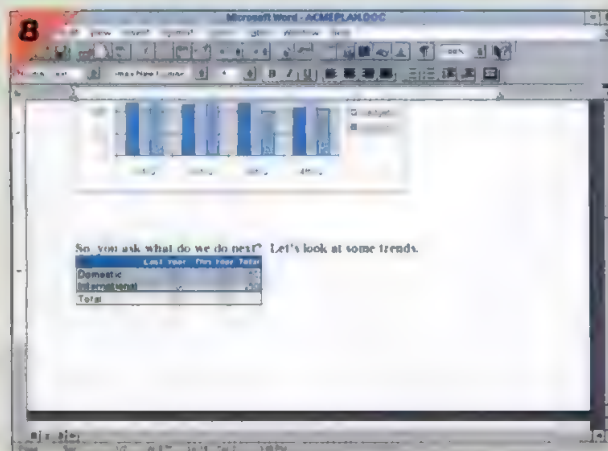
Other vendors can play. A Visio drawing has been placed in our document. Double-clicking on the object lets us edit in place.



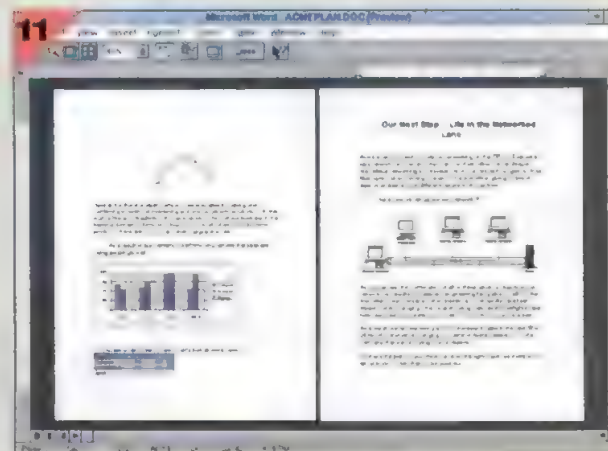
Within your document, menu negotiation provides Word's File and Help menus but Excel's menus, toolbars, and functions.



Menu negotiation provides a wealth of tools. We open a Stencil and select an item to add using Visio's drag-and-drop drawing.



The result is an Excel table that looks and works like an integral part of the document.



The final product combines features from Word, Excel, and Visio. OLE 2.0 lets us do all this without leaving the document.

instance, you could put a spreadsheet data object in a word processing document, then double-click on the spreadsheet data to launch the spreadsheet application. Documents containing embedded data objects are called compound documents.

When you embed data, the data itself and instructions on how to manage it are physically stored within the compound document. This document-centric approach has the advantage of making the document the single repository of all of required information instead of having, say, separate word processing, spreadsheet, and graphics files.

Applications can choose to be able to contain objects (in which case they are called a container, or an OLE client), to act as embedded objects (in which case they are a component, or an OLE server),

or to be both.

OLE 1.0 was a big step beyond earlier integration technologies. It went way beyond import/export filters and the common Clipboard's cut, copy, and paste commands found in environments such as the Macintosh, Windows, and OS/2. It was also different from simpler standards like the Dynamic Data Exchange (DDE) used in Windows and OS/2. (DDE simply links data together from multiple files so that changes made in one file are reflected in the other.)

While widely adopted, OLE 1.0 is slow

Object Linking Goes Head to Head

☒ = YES ☐ = NO	Microsoft OLE 2.0	Component Information Laboratories OpenDoc
Companies offering support	Microsoft, many independent software vendors	Apple, Borland, IBM, Novell, Oracle, Taligent, WordPerfect, Xerox
Object-linking standards	OLE 2.0	OpenDoc
Object frameworks	Microsoft Foundation Classes, Borland's OWL	Novell's AppWare, Borland's OWL, Taligent
Document storage	DocFiles	Bento
Object model	Component Object Model (COM)	Distributed System Object Model (DSOM)
Single-page object-size limitation	☒	☐
Networkable objects	☐	☒
Current status	Applications now shipping	Specification due shortly

and confusing. When you double-click on an embedded object, you launch that application in a new window. You can edit the object, but you can't see the context around it. For instance, PowerPoint uses an OLE 1.0 charting module to

create graphs for use in presentations. But when you launch that charting engine, you can't see other parts of the slide around the graph, making layout difficult.

Some application vendors saw this as a problem and came up with alternatives, such as Lotus's TOOLS (Technology for Object-Oriented Linking and Sharing). Using this technology, Ami Pro lets you place a drawing within your document and edit it using Ami Pro's drawing module while still seeing the complete document context. The problem with this approach is that it is proprietary. It only

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works in Ami Pro, not even between Ami Pro and Lotus 1-2-3, and certainly not with other vendors' applications.

NEW AND IMPROVED: OLE 2.0

Microsoft's OLE 2.0 standard for Windows, developed after discussions with many software vendors, offers an industry-standard alternative. The most obvious change in OLE 2.0 is that it lets you edit OLE objects *in place* within the context of the container document.

When you double-click on an embedded object, the basic menus and tools of the container application change to incorporate those of the server application that created the object. This so-called menu negotiation might give you the standard File and Edit menus of the container program plus specific menus appropriate for the object you are editing. A similar process negotiates the toolbars of the two applications.

This context change can still be jarring, as the original application's menus and most of its tools disappear when you double-click on an embedded object. And

with two applications negotiating for the menu display, what actually happens remains largely at the discretion of each application vendor. But OLE 2.0 has distinct advantages. You can double-click on a chart and get a graphing tool, click on a spreadsheet table and edit it in your favorite spreadsheet application, and click on text and use your favorite word processor—all without leaving your current application. Clearly, this is a big step.

OLE 2.0 includes a number of other changes as well. One that will be immediately apparent to the end user is support for dragging and dropping OLE objects from one application window to another. This will let you take a chart in a spreadsheet, for instance, and simply drop it into your word processing application.

Possibly the most far-reaching change is that OLE 2.0 is designed to be programmable. This feature, called OLE automation, allows applications to expose functional objects—spell-checking or charting modules, for example—and to pass data and messages between applications. Programmers can use macro or pro-

gramming languages to call this exposed functionality through published application programming interfaces (APIs) that consist of the methods and properties of the exposed objects.

In effect, this turns off-the-shelf programs into libraries of reusable code. Macro programmers can link objects from a variety of programs into new, compound applications for automating complex tasks.

Several changes below the surface make OLE 2.0 much more robust than its predecessor. A large part of this is a new format that applications use for storing objects, called DocFiles. This format lets compound documents act as self-contained file systems. Documents as files will also form the basis for the file system in Cairo, the planned object-oriented version of Windows NT.

As a result, OLE 2.0 is faster, as objects remain on disk until needed rather than being fully loaded into memory each time the document is opened. OLE 2.0 also has better support for nested objects—objects within other objects—such as a chart embedded in a spreadsheet table embedded

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Performance Benchmarks		
(figures indicate relative performance)	Intel 386	Cyrix 486 Upgrade
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MS Word 2.0	1.0x	2.8x
Micrografix Designer 3.1	1.0x	2.6x

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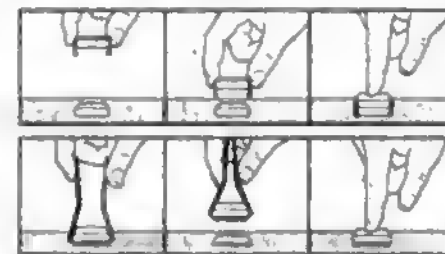
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Applications Integration

in a word processing document. In addition, OLE 2.0 does a better job of maintaining links when the object file is moved within your directory structure. With OLE 1.0, any movement of object files resulted in lost links. In OLE 2.0, if you move a container and an object to the same directory, OLE will maintain those links. However, move an object without the container and the link will still be lost.

OLE implementations will vary from one program to the next, since developers can support some or all of the features defined by the OLE spec. Applications can allow objects to be embedded in them, and they can allow themselves to be embedded in other applications. They can support objects being dragged out of them and objects being dragged into them. They can expose objects that can be called by OLE automation, and they can include macro languages that can control OLE-enabled applications. Initially, many applications may not support all of these features.

OLE'S BRICK WALL

While OLE 2.0 is a big advance, it does have some real limitations. You can't embed objects that are larger than a single page. Also, OLE has no features for tracking objects over a network—meaning that all of the embedded objects and applications should be on the same drive as your document. Microsoft's future network strategy foresees better support for OLE, including using its planned Cairo operating system on a server to track OLE items. In the meantime, third-party tools such as Lotus Notes, Saros Corp.'s Saros Document Manager, and Object Productivity's Object Organizer 1.0 for Windows give you some ability to distribute objects across a network.

The biggest problem with OLE is on the developer's side. Implementing OLE is tantamount to rethinking your application, breaking it down into its component pieces. Also, the tools for developers have thus far been very limited, although most

of the major development-tool vendors are working on solutions for making it easier to create OLE 2.0 applications, such as OLE-aware frameworks for C++ compilers.

A more political question is whether the various Microsoft applications groups were on an inside track to OLE and other operating system developments. The OLE 2.0 specification was not final until the middle of 1993, and the libraries (the DLLs that enable OLE) have required interim updates. Microsoft shipped the Software Development Kit in mid-1993 and an OLE 2.0-enabled version of Microsoft Publisher shortly thereafter. More recently, it shipped Word 6.0 for Windows (including updated libraries), and it plans to ship OLE 2.0-enabled Excel 5.0 by press time. In contrast, only a few third-party applications, notably Shapeware's Visio drawing program, Version 2.0, support

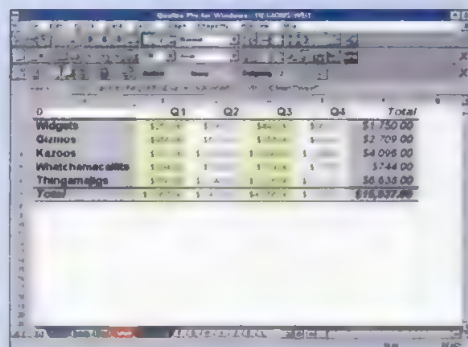
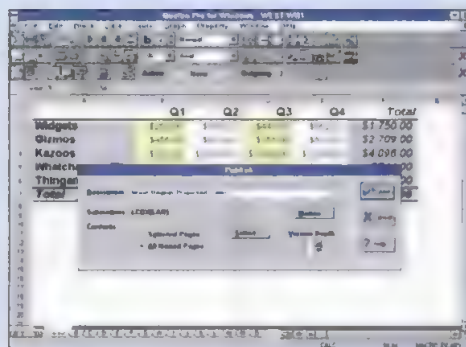
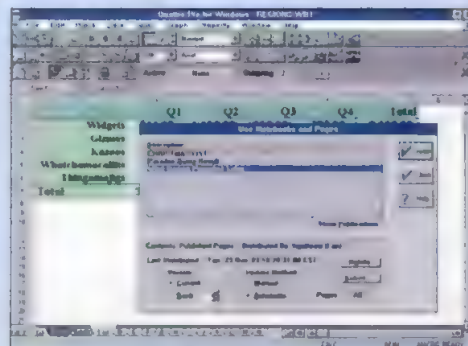
Apple, Borland, IBM, Novell, Oracle, Taligent, WordPerfect, and Xerox announced an OLE competitor called OpenDoc last September. As of this writing, the formal OpenDoc specification has not been completed, much less have any completed applications been shipped.

OpenDoc is intended to be an object specification based on open standards; its backers draw a parallel with the XWindows consortium that handles windowing systems used on Unix platforms. Unlike OLE, which was essentially designed for Windows, OpenDoc is designed to work across multiple operating systems from the Macintosh to Windows to OS/2 to Unix.

The OpenDoc concept is a cross-pollination of technologies from different vendors. The basic OpenDoc linking and embedding technology will be based on earlier work from Apple known as Jedi or

■ Borland's OBEX

Object Exchange (OBEX) is the technology built into key Borland applications for intelligently sharing information across a workgroup. In OBEX, you "publish" information, like one or more pages of a Quattro Pro for Windows notebook (below). Another user on a LAN or e-mail system could then use the workgroup desktop to "subscribe" to published data (upper right) that then appears in a new notebook page (lower right).

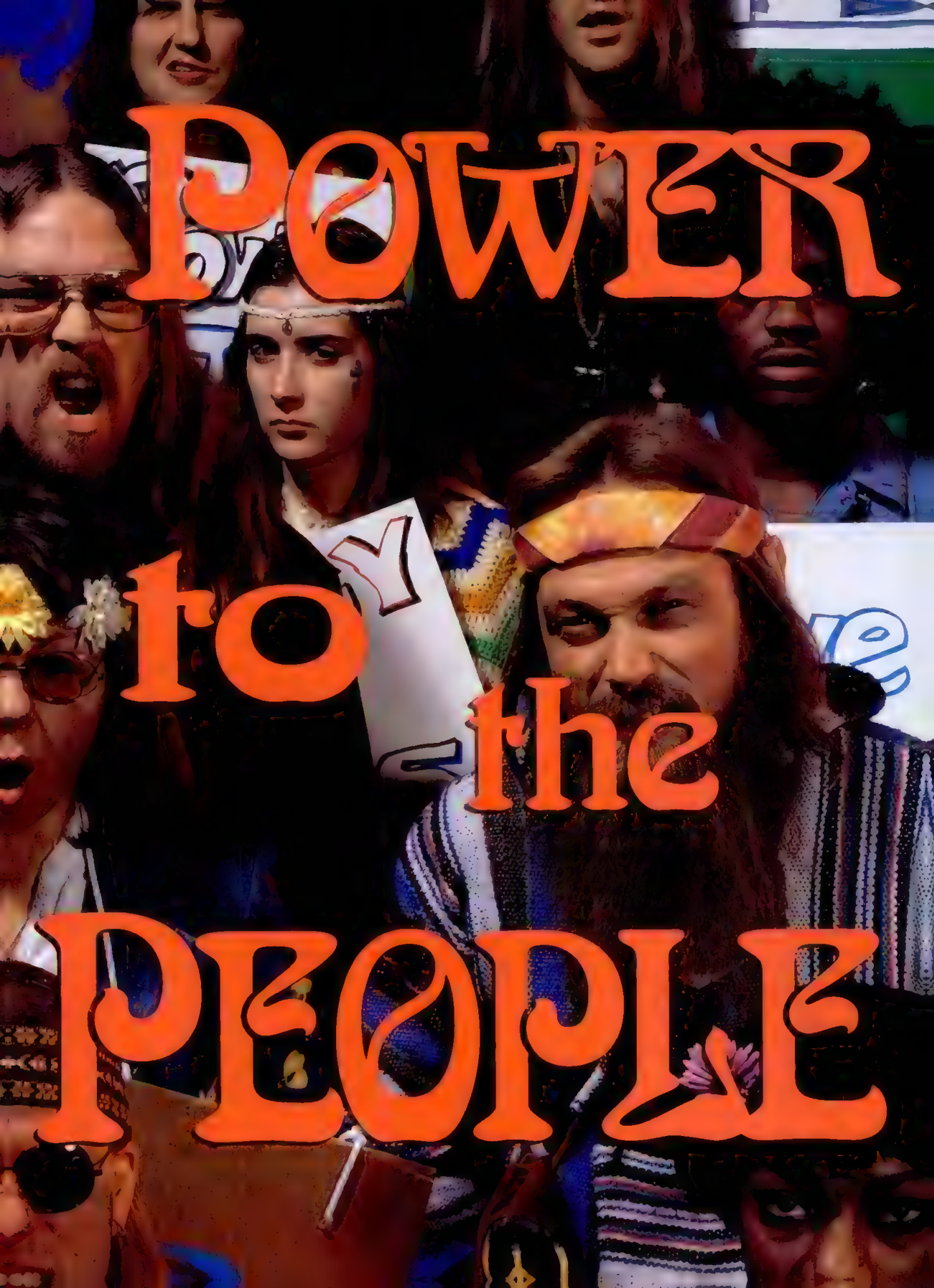


OLE 2.0. Most vendors, including those publicly committed to OLE 2.0 like Lotus Development Corp., are still at least months away from releasing apps with OLE 2.0 features.

OPENDOC: OLE SQUASHER?

In part to compete with Microsoft and in part to address some of the limitations of OLE, a new coalition of vendors including

Amber. It will use the Bento file format for storing compound documents, developed by Apple and based on earlier work by Lotus. It will use Apple's OpenScripting architecture for cross-application scripts. The underlying object model will be based on IBM's System Object Model (SOM), originally introduced in OS/2 2.0. WordPerfect's part is to work on making OpenDoc compatible with OLE. An in-



POWER

to the

PEOPLE



Now more than ever, we're giving power to the people. Our Pentium-based PCI systems are priced hundreds, sometimes thousands of dollars less than competitors' comparably configured Pentium systems. That's PC power everyone can afford!



You Got It, Baby!

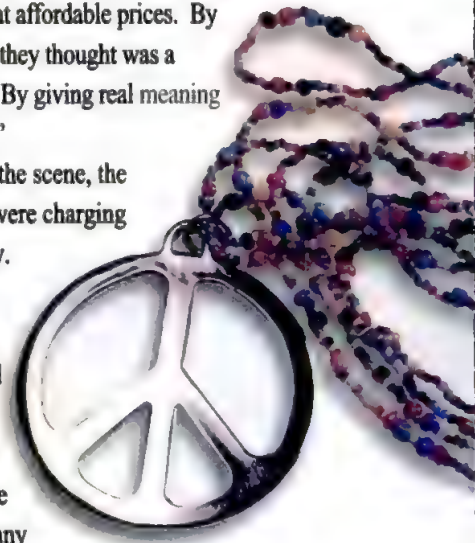


By the Time We Get to Woodstock

When historians write the history of the personal computer industry years from now, they'll remember Gateway 2000™ as the radical PC manufacturer that gave power to the people by selling the highest-quality, latest-technology computers at affordable prices. By showing PC buyers a level of service they thought was a throwback to the peace and love era. By giving real meaning to the tattered, worn-out term "value."

When Gateway 2000 came onto the scene, the establishment computer companies were charging whatever they wanted for technology. Gateway was a real downer to them because we began selling the same technology for a whole lot less. And the buyers were very smart. They shouted, "Hell no, we won't go," to the big companies, and took a chance on the revolutionary Midwest company called Gateway 2000. Soon a great legion of people — even more than Woodstock attracted — was buying Gateway PCs.

Today, Gateway 2000 is bigger than many of the companies for which it was an alternative. So why should you buy a Gateway computer today? Same reasons as in the beginning. You still get the best price, quality and service from us.



Demonstrations

That's why, for the third consecutive year, we swept *Computer Shopper's* Best Buy Awards, winning every product award we were eligible for and being chosen as the Best Overall Systems Supplier. (Thanks, *Shopper* readers!) That's why we took five top honors in *PC World's* World Class Awards, including Best Mail Order Company and Best Service and Support. (Thanks, *PC World* readers!) And even though we're now a Fortune 500 company, we still champion anti-establishment thinking. Check it out. You'll find GW2K is far-out, groovy and totally unreal!

We dedicate this ad to the memory of Sol Pessin, one of our special customers who believed in us during the early days. We'll miss you, Sol.



8 0 0 - 8 4 6 - 2 0 6 3

Gateway Gives You Performance

The Eagle has Landed

When Gateway introduced a Pentium™-based system — loaded — for under \$4,000, everybody in the industry knew the Eagle had landed. The best PC value on the planet had arrived! The editors of *PC/Computing* heralded the accomplishment by naming it Best Desktop of 1993.

Then we topped our achievement by offering *four* Pentium processor-based systems, including a *new 66MHz model*, priced from \$2,495 to \$3,995. Now that's a giant leap in value for one of the highest-performance PCs on earth. These systems are tomorrow's technology available today at affordable prices — only from Gateway.

Our P5 systems include Intel's 64-bit Pentium processor, which moves instructions and data twice as fast as a 486 system. The P5 PCs get another performance boost from a PCI local bus. The PCI bus can operate 10 to 15% faster than a VESA® local bus. The PCI bus' "plug and play" feature makes your PC easier to use, too, by automatically configuring peripherals.

Space-Age Video

The PCI bus is coupled with a space-age video system, with 2MB standard video memory giving you 64,000 colors at 1024 x 768 resolutions. The PCI-based video system uses a high-performance 64-bit interface to video memory that achieves 16 million colors, true 24-bit, in VGA and SVGA resolutions. Our standard video system gives you the best overall performance on the market.

The net effect of the PCI local bus and this video system is performance that will send you into orbit. It's definitely far-out!

486 PCI Local Bus System is A-OK

The PCI local bus and PCI video system are also available in a 66MHz 486DX2 system, Intel® verified to be Pentium upgradable. Another A-OK value in a high-performance system from Gateway!



Photo courtesy of NASA. Thanks!



8 0 0 - 8 4 6 - 2 0 6 3

That's Out Of This World!



Our P5-60 was named Best Desktop of 1993 by the editors of PC/Computing. "(It) is nearly twice as fast as its nearest competitor at Windows operations. When it comes to top-of-the-line desktop systems, you can't beat high performance for a low price," states the editorial.



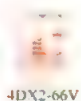
New this month is our 66MHz Pentium-based system for only \$3,995.



Be A Trend-Setter With A



Our 4DX2-66V model has to be one of the most highly decorated PCs in the history of the industry. For good reason! Like other Gateway VESA and integrated systems, it's a very attractive value.



Gateway VESA Or Integrated PC

You'll be a trend-setter in your office or neighborhood if you choose a Gateway VESA® or integrated system because there's nothing more fashionable than a great buy. Everybody wants one!

VESA a Go-Go

Our VESA local bus machines give you go-go performance at a fab price. VESA, which stands for Video Electronics Standards Association, assures you of compatibility with any VESA peripheral. These systems are also upgradable to a Pentium™ OverDrive™ Processor if you need more processor power in the future.

Integrated PCs Sock it to 'Em

Our integrated systems definitely sock it to the competition. Offered in space-saving mini desktop cases, our local-bus integrated PCs give you twice the video performance available in many standard desktop machines. In fact, video performance in our integrated systems is similar to, or better than, that found in many of our competitors' high-end systems.

Of course these machines are also upgradable to a Pentium OverDrive Processor.

Our special Family PC, with full multimedia capabilities and some exciting software choices, is priced at only \$1,995. Ask us for details.

If you want a mod PC for the fewest dollars possible, you want an integrated system from Gateway. You can bet your bippy on that!

Energy Stardom

All Gateway 2000™ VESA local bus and integrated systems wear the Energy Star seal to show they comply with energy-saving guidelines established by the EPA. Our commitment to the Energy Star program is just one of the ways we're working to help the environment — and to help you save money!



Our Family PC comes with CD-ROM, sound card, speakers, joystick, fax/modem and multimedia software. You choose one software option from five great Family PC multi-title packages. Some of the outstanding titles you can get are: Microsoft Works™, Dinosaurs and Encarta™, Cinemania™, Time Almanac, Links Golf Collection, The Animals, MicroProse™ Game Pack, MECC Elementary Education Pack — and more!



"You've got a friend in the business.™"

8 0 0 - 8 4 6 - 2 0 6 3

For The Rolling Stone In You,

Whether you travel constantly from continent to continent or occasionally from office to home, Gateway has the perfect portable PC to keep you rollin' on down the highway.

Easy Rider

The revolutionary HandBook® 486 gives you more MIPS per pound than any other PC! Plus, the HandBook is the answer to the most common question seasoned portable users ask themselves: should I take my portable or not? Is it worth the hassle? With a HandBook, you'll never ask yourself that question again. It's so small and light, it's effortless to carry. The decision is automatic: of course you'll take your HandBook. You'll never want to be without it! The HandBook is a truly extraordinary product that will forever change the way you use a PC.

The HandBook has all the features that matter to you, too, including: ideal weight and size (less than 3 pounds, about the size of a day-planner); plenty of power (genuine Intel SL Enhanced 486 processor); great screen (bright, 7.9-inch backlit VGA display);

comfortable 78-key keyboard; EZ Point integrated

pointer (no need to carry a clumsy mouse);

excellent battery life (up to four hours);

suspend/resume (a handy feature that allows

you to stop work any time and resume later

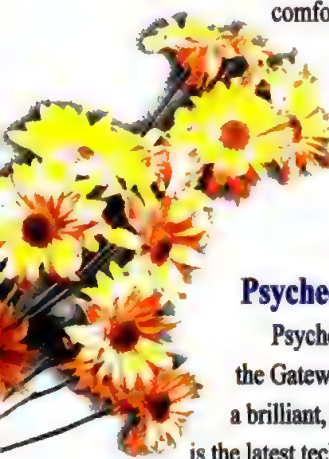
without losing data or restarting the system).

Psychedelic Day-Tripper

Psychedelic color for flower children of all ages. That's the Gateway 2000™ ColorBook™. The ColorBook includes: a brilliant, 9.4-inch VGA color screen (dual-scan STN color

is the latest technology in color displays); 486 performance (genuine Intel SL Enhanced 486 processor); excellent portability (weighs less than 5.7 pounds and is ultra-thin — just 1.77 inches); simultaneous video up to 1024 x 768 resolution; a built-in trackball (very easy to use); two PCMCIA Type II slots (can also be used for one Type III PCMCIA card); great battery life (up to four hours); suspend/resume feature.

If you want dazzling color at a mono price, look no further than the ColorBook.



8 0 0 - 8 4 6 - 2 0 6 3

Gateway Has Groovy Portables.



On your next trip, be sure to take along a good book.
That's a HandBook or a ColorBook from Gateway 2000!



Add A Twist



Shown here is our 4DX2-66V model loaded with options including a 17-inch CrystalScan monitor, combo floppy drive, multimedia kit with optional Yamaha speakers, Colorado Memory Systems tape backup unit, FlightStick and Epson Stylus 800 printer. With multimedia, the sights and sounds of any era are available to you with a click of your mouse. Right on!

PORTABLES

HANDBOOK® 486

- Weight: 2.94 Lbs.
- Dimensions: 9.75" x 5.9" x 1.6"
- SL Enhanced Intel® 486 Processor
- 4MB RAM (expands to 8MB or 20MB)
- 80 to 130MB IDE Hard Drive
- 7.9" Backlit VGA Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 1 PCMCIA Type II Slot
- EZ Point™ Integrated Pointer
- 78-Key Keyboard
- Parallel, Serial & PS/2 Ports
- MS-DOS®, Windows™ & Serial Transfer Cable

HANDBOOK 486SX-25

With 25MHz 486SX CPU and 80MB Hard Drive
\$1495

HANDBOOK 486DX2-40

With 40MHz 486DX2 CPU and 130MB Hard Drive
\$1995

HANDBOOK PACKS

Traveler's Packs:

- Microsoft Works for Windows, case, extra battery & PCMCIA 9600/2400 fax/modem. **\$369**
- Microsoft Works for Windows, case, extra battery & PCMCIA TelePath™ fax/modem. **\$489**

Presenter's Pack:

- PCMCIA VGA adapter, Asymetrix® Compel & case. **\$319**

PORTABLE OPTIONS

PCMCIA Cards:

- TelePath 14400/14400 fax/modem. **\$319**
- 9600/2400 fax/modem. **\$199**
- Ethernet adapter. **\$189**
- Token Ring adapter. **\$449**
- HandBook VGA adapter. **\$229**

Batteries:

- 2.2Ah NiMH batteries. **\$89**
- Alkaline battery pack. **\$29**

Diskette Drive:

- HandBook external 1.44MB. **\$99**

Cases:

- ColorBook **\$49** HandBook **\$55**

Extended VIP Warranty:

- We'll ship a replacement within 24 hours during warranty. Point of sale only. **\$100**

COLORBOOK™

- Weight: Under 5.7 Lbs.
- Dimensions: 11.7" x 8.5" x 1.77"
- SL Enhanced Intel 486 Processor
- 4MB RAM (expands to 8, 12 or 20MB)
- 3.5" 1.44MB Diskette Drive
- Removable 80 to 250MB IDE Drive
- 9.4" VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II Slots
- Integrated Trackball (2 buttons)
- 85-Key Keyboard
- Parallel, Serial & PS/2® Ports
- External VGA Port
- MS Works for Windows™
- MS-DOS and Windows

COLORBOOK 486SX-25

With 25MHz 486SX CPU and 80MB Hard Drive
\$1995

COLORBOOK 486SX-33

With 33MHz 486SX CPU and 170MB Hard Drive
\$2395

COLORBOOK 486DX-33

With 33MHz 486DX CPU and 250MB Hard Drive
\$2795

COLORBOOK PACKS

Traveler's Packs:

- Case, extra battery & PCMCIA 9600/2400 fax/modem. **\$329**
- Case, extra battery & PCMCIA TelePath fax/modem. **\$449**

NOMAD 486DXC

- Weight: 6.2 Lbs.
- Dimensions: 8.5" x 11" x 2.2"
- 50MHz Intel 486DX2 CPU
- 8MB RAM
- 3.5" 1.44MB Diskette Drive
- 200MB IDE Hard Drive
- 8.4" Color Active Matrix Screen
- NiMH Battery & AC Pack
- Simultaneous Video with IMB
- 79-Key Keyboard & Mouse
- 9600/2400 Fax/Modem
- 1 Parallel, 1 Serial Port
- MS-DOS, Windows & Works
\$3995

MULTIMEDIA KIT

Here's everything you need to add multimedia to any Gateway desktop PC. You won't find a better holiday price anywhere!

- Gateway 2000 16-Bit Sound Card, Sound Blaster™ Compatible
- Double-Speed CD-ROM
- 2 Labtec® Speakers
- Microsoft Encarta & Corel Photo CD Software
- Gateway System CD

\$299

For system configurations that include a CD-ROM drive: **\$132**
Only with system purchase.

SOFTWARE & EXTRAS

If a system comes with "choice of application software," choose one of the following packages:

- Microsoft Excel for Windows™
- Microsoft Word for Windows™
- Microsoft Word and Bookshelf '92® CD-ROM Edition
- Microsoft PowerPoint for Windows™
- Microsoft Project for Windows™
- The Entrepreneur Pack (Works™, Publisher™, Money™ & games)
- Borland Paradox® database and Quattro® Pro for Windows spreadsheet
- Microsoft Access™ for Windows

With desktop and selected portables you also get the following software and extras at no additional charge:

- MS-DOS 6.2 & Windows for Workgroups 3.11
 - CoSession™ Host Remote Diagnostics (with all modems)
 - Kiplinger's™ CA-Simply™ Money
 - QAPLUS Diagnostics
 - Gateway Computer Glossary
 - Gateway Mouse Pad
- Systems with CDs also include:
- Gateway System CD with Microsoft Multimedia Pack™
 - Multimedia On-Line User's Guide
 - Gateway Mall On-Line Catalog

SERVICE

Every Gateway system is backed by:

- 30-Day Money-Back Guarantee
- One-Year Limited Warranty
- Lifetime Toll-Free Technical Support
- On-Site Service Available To Most Locations
- Lifetime BBS Membership
- FaxBack Automated Fax Service

Our money-back guarantee does not include shipping. On-site service is provided at no charge during warranty if our technicians determine it is necessary. If you'd like to read our warranty and guarantee policies, please call for a free copy.



Printed on recycled paper with soy inks.

Gateway 2000 is a corporate sponsor of
GLOBAL RECYCLE



Networking

Intel EtherExpress™

A 16-bit Ethernet adapter from a world leader in networking. **\$105** Twisted Pair or BNC Kit (BNC kit includes cable, connector, terminator and card).

Ethernet Adapter from 3Com®

Manufactured by 3Com for Gateway. Features parallel tasking architecture with a high level of integration. **\$105** Twisted Pair. **\$125** BNC Kit (includes cable, connector, terminator and card).

Monitors

CrystalScan® 17-Inch Monitor

Non-interlaced color monitor, .26mm dot pitch. If your system comes with a 14-inch monitor, you can upgrade to this monitor for **\$430**. If your system comes with a 15-inch monitor, you can upgrade for **\$350**. (Prices good only for upgrades at the time of system purchase.)

Printers

Epson® 1070+ Printer

Here's a value-priced, wide-carriage dot matrix printer that gives you 225cpi in draft mode, 10 letter-quality fonts and 4 scalable fonts. Quiet, too (46.5db)! **\$359**

Panasonic Color-Capable Printer

Add color to your documents with this 24-pin dot matrix printer. Includes Adobe Type Manager® KX-P2123 **\$259**; Color Option **\$50**

Epson Stylus 800 Ink Jet Printer

Great laser quality at an even greater value. Measuring only 17 inches by 10.5 inches, the Stylus 800 has seven different typefaces and prints an extra-quiet 150 characters per second at 360dpi. Parallel cable included. **\$289**

Epson ActionLaser 1500 Laser Printer

The ActionLaser delivers professional-quality printouts with crisp, sharp images, black blacks and smooth, "jag-free" lines. It also features a fast six-page per minute print speed, 14 resident fonts, 300 x 300dpi, and 1MB memory expandable to 5MB. Parallel cable included. **\$669**

TI MicroLaser™ Pro 600

This Texas Instruments laser printer redefines value in high-performance printing with 6MB RAM standard, a fast eight pages-per-minute print rate, 500-sheet capacity and true 600dpi quality.

With 23 PostScript® Fonts: **\$1,449**

With 65 PostScript Fonts: **\$1,629**



Lexmark 4039 10R

The printer for tomorrow's technology! Featuring a fast, RISC processor it switches between PostScript and PCL5 printer languages automatically and prints at a remarkable 10 pages per minute at true 600dpi. **\$1,399**

Easy Payment Options

We make it easy for you to buy a Gateway PC, too! We accept most major credits cards and C.O.D. terms, with net 30-day terms and leasing options available to qualified commercial customers.



You can also apply for our new Gateway 2000™ DuoLine™ MasterCard® Card, issued by Dial National Bank, which lets you make purchases from Gateway and anywhere else MasterCard is accepted by giving you two lines of credit — one for Gateway purchases and one for all other purchases. For Gateway purchases, the card has no annual fee and a low variable interest rate of just 12.9% APR. For other transactions, you get a variable interest rate of 13.9% APR and a low \$18 annual fee.*

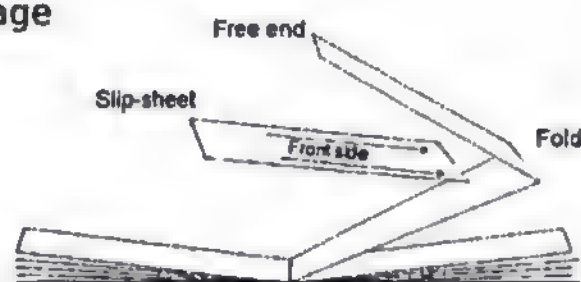
*Cash advance fee is \$1 plus 2% of the amount of the cash advance, but not less than \$5 nor more than \$10. Financing is available on approved credit with the Gateway DuoLine MasterCard, issued by Dial National Bank, Des Moines, Iowa.



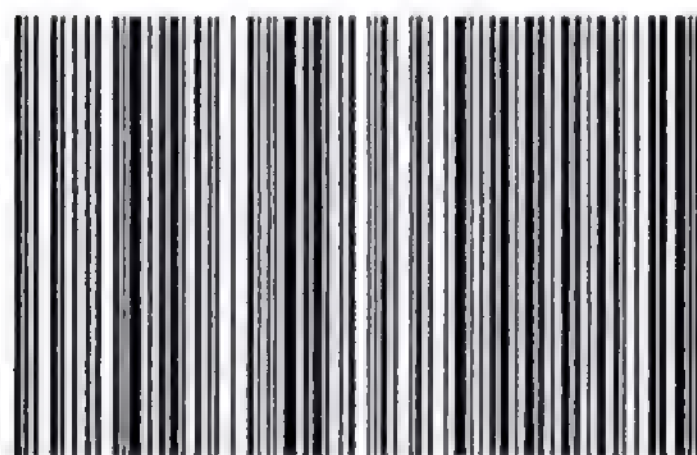
8 0 0 - 8 4 6 - 2 0 6 3

Our '60s models are all Gateway 2000 employees and their children who relived the flower-power era for this ad.

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Foldout slip-sheet



GbsSlipSheet-001

Inverted Foldout slip-sheet

Folded edge of the page

1. Open the foldout page

2. Insert this sheet with

1. Front side touching the free page

2. Arrow pointing to the fold

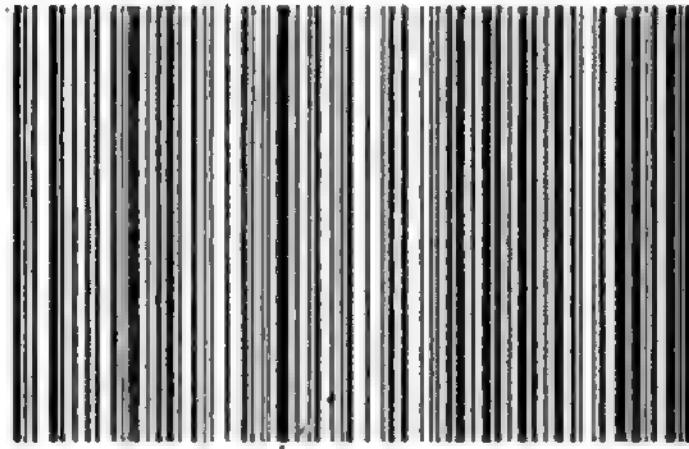
3. Slice the folded edge

4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



GbsSlpBack-0018

Back

1. Follow instructions on the other side

To Your Gateway PC!



When you've picked the PC you want, take a look at the options listed here to make your system as productive and fun as possible. Sorry, the peripherals listed here are sold only with the purchase of a system. For details on our complete line of extras for Gateway customers, ask for our special add-on components division when you call.

Multimedia

Multimedia Kit

Here's everything you need to add multimedia to your Gateway PC:

- Gateway 2000™ 16-bit CD-quality sound card, compatible with Sound Blaster™ cards, with MIDI/game port, mic in, stereo line in/out
 - Double-speed CD-ROM drive, tray-loading, compatible with music CDs, multisession photo CDs and CD-ROM titles
 - 2 Labtec® speakers that attach to your PC monitor
 - Microsoft® Encarta & Corel Photo CD software
 - Gateway 2000 System CD with Microsoft Multimedia Pack™
- \$299**

For system configurations that include a CD-ROM drive, get the multimedia kit without CD-ROM drive for: **\$132**

Yamaha®YST-M10 Multimedia Speakers

New! The small speakers that sound big. And come with a tiny price. This free-standing, self-powered speaker set is a great value! **\$75**

Altec Lansing Multimedia Speakers

Get superior stereo sound with these top-rated Altec Lansing ACS-300 speakers with separate powered subwoofer. **\$219**

CH FlightStick

The joystick that's recommended by our kids! With a sensational "feel" and rugged construction, this is the last joystick you'll ever have to buy! **\$35**

Communications & Storage

TelePath™ II Fax/Modem

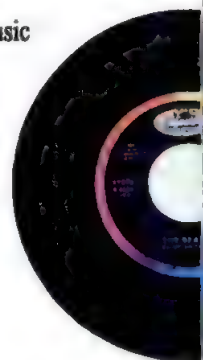
Internal fax/modem, 14,400bps modem, V.32bis, with 14,400bps fax capability. Package includes data and fax communication software, plus a CompuServe® trial membership. **\$159**

Cardinal® 2400 Fax/Modem

Internal fax/modem, 2,400bps modem, V.22bis, with 9,600bps fax capability. Package includes data and fax communication software. **\$49**

Colorado Memory Systems® TBU

250MB internal automatic tape backup unit copies up to 9.5MB per minute. Comes with Windows and DOS software, one tape and cable. **\$159**



INTEGRATED & VESA SYSTEMS

4SX-33/4DX-33

- Intel 33MHz 486SX or DX CPU
- 4MB RAM
- 212MB 13ms IDE Hard Drive
- Local Bus Graphics with 512KB
- 3.5" Diskette Drive
- 14" Color CrystalScan® 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 101-Key Keyboard & MS Mouse
- MS-DOS® 6.2 & WFW™ 3.11
- MS Works for Windows™
- EPA Energy Star Compliant

4SX-33 - \$1295

4DX-33 - \$1495

4DX2-50/4DX2-66

- Intel 50 or 66MHz 486DX2 CPU
- 4MB RAM, 128KB Cache
- 424MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- 3.5" Diskette Drive
- 14" Color CrystalScan 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- AnyKey® Keyboard & MS Mouse
- MS-DOS 6.2 & WFW 3.11
- Choice of Application Software
- EPA Energy Star Compliant

4DX2-50 - \$1795

4DX2-66 - \$1995

4SX-33V

- Intel® 33MHz 486SX CPU
- 4MB RAM
- 212MB 13ms IDE Hard Drive
- VLB™ Graphics with 1MB
- Local Bus IDE Interface
- 5.25" & 3.5" Combo Drive
- 14" Color CrystalScan® 1024NI
- Baby AT Case
- 5 ISA & 2 VESA®/ISA Slots
- AnyKey® Keyboard & MS Mouse
- MS-DOS® 6.2 & WFW™ 3.11
- Choice of Application Software
- EPA Energy Star Compliant

\$1495

4DX2-50 FAMILY PC

- Intel 50MHz 486DX2 CPU
- 8MB RAM, 128KB Cache
- 212MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- Double-Speed CD-ROM, 16-Bit Sound Card & Speakers
- 2400/9600 Data/Fax Modem
- 3.5" Diskette Drive
- 14" Color CrystalScan 1024NI
- Mini Desktop Case
- 5 16-Bit ISA Slots
- 101-Key Keyboard, MS Mouse & Joystick
- Choice of Family PC Software
- EPA Energy Star Compliant

\$1995

VESA & PCI SYSTEMS

4DX-33V/4DX2-50V

- Intel 33MHz 486DX or 50MHz DX2 CPU
- 8MB RAM, 128KB Cache
- 424MB 13ms IDE Hard Drive
- VLB Graphics with 1MB
- Local Bus IDE Interface
- 5.25" & 3.5" Combo Drive
- 14" Color CrystalScan 1024NI
- Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- AnyKey Keyboard & MS Mouse
- MS-DOS 6.2 & WFW 3.11
- Choice of Application Software
- EPA Energy Star Compliant

4DX-33V - \$1975

4DX2-50V - \$1995

4DX2-66V BEST BUY

- Intel 66MHz 486DX2 CPU
- 8MB RAM, 128KB Cache
- 424MB 13ms IDE Hard Drive
- VLB Graphics with 1MB
- Double-Speed CD-ROM
- Local Bus IDE Interface
- 3.5" Diskette Drive
- 15" Color CrystalScan 1572FS
- Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- AnyKey Keyboard & MS Mouse
- MS-DOS 6.2 & WFW 3.11
- Choice of Application Software
- EPA Energy Star Compliant

\$2295

P4D-66

- Intel 66MHz 486DX2 CPU
- 8MB RAM, 256KB Cache
- 424MB 13ms IDE Hard Drive
- PCI Local Bus Graphics with 2MB
- Double-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Color CrystalScan 1572FS
- Baby AT Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- AnyKey Keyboard & MS Mouse
- MS-DOS 6.2 & WFW 3.11
- Choice of Application Software

\$2495

4DX2-66V

- Intel 66MHz 486DX2 CPU
- 16MB RAM, 128KB Cache
- 424MB 13ms IDE Hard Drive
- VLB Graphics with 2MB
- Double-Speed CD-ROM
- Local Bus IDE Interface
- 3.5" Diskette Drive
- 15" Color CrystalScan 1572FS
- Baby AT Case
- 5 ISA & 2 VESA/ISA Slots
- AnyKey Keyboard & MS Mouse
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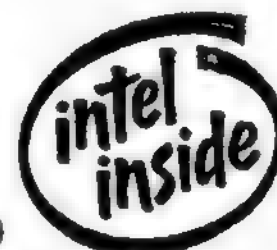
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Thank You



Thank you, Gateway customers everywhere, for your support in 1993. As you can see by the number of major industry awards we received, it was another banner year for Gateway 2000. And we owe this success to you. Our most treasured honors are the "Readers' Choice" awards that come from PC users. The majority of our awards are this variety, which is why we feel so fortunate this year.

Thanks again for these groovy tributes. We'll do everything in our power to live up to the confidence you've shown in us. You're the best!

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dustry consortium called Component Integration Laboratories is coordinating these efforts and will certify that applications are OpenDoc-compatible.

The OpenDoc specification differs dramatically from OLE. OpenDoc will use a SOM variant called Distributed SOM (DSOM) as the underlying object model. This will allow objects to be dis-

applications.

Fortunately, OpenDoc will be designed to be compatible with OLE so that users will be able to place OLE-compatible components into OpenDoc containers and vice versa. If this works, the two standards might coexist transparently. (For a comparative summary of OLE and OpenDoc object-linking standards, see the

under DOS. But Windows has given birth to a variety of powerful tools ranging from batch-language processors such as SoftBridge's Bridge Toolkit and Wilson WindowWare's WinBatch to newer, more graphical approaches such as Prodea's ProdeaSynergy.

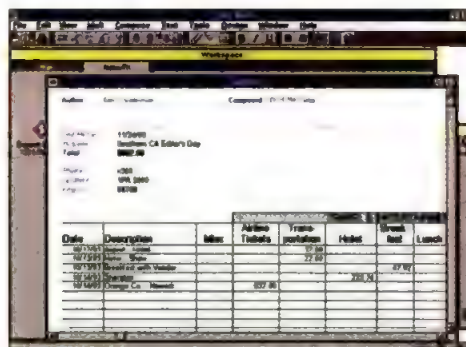
What is totally new is that major software vendors are developing macro lan-

guages that will ship with and work across an entire suite of applications. Microsoft leads the field with Visual Basic, Applications Edition (VBA), a scripting language that uses OLE 2.0 to communicate between programs. VBA is slated to ship in Excel 5.0 and is planned to be added to other Microsoft programs over time. This language will be unique to Microsoft products but can be used to manipulate properties and methods of exposed objects in any OLE 2.0 application.

Similarly, Lotus is working on its LotusScript, designed as a common language for Lotus products as well as a replacement for keystroke macros. Lotus plans its applications to allow access to their objects

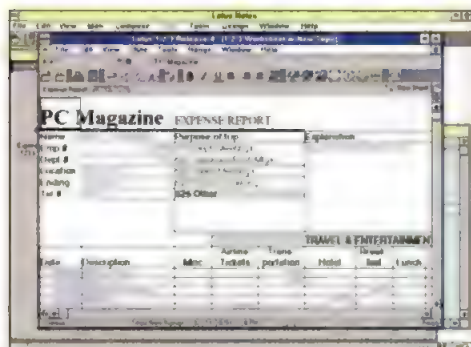
▪ Lotus Notes F/X

Notes F/X is Lotus's technology for letting multiple users store and track objects using Lotus Notes. With Notes F/X, you might use Notes to launch a Lotus 1-2-3 for Windows template (below). When filled out, the resulting spreadsheet is stored in Notes as an OLE object, and specific fields are linked to Notes fields (upper right). These fields can be viewed in Notes, totalled (lower right), or linked to other applications.



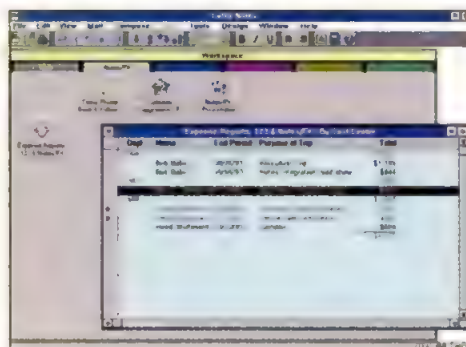
The screenshot shows a Lotus Notes form with a table. The table has columns: Date, Description, Miles, Airfare, Train, Hotel, Breakfast, and Lunch. The data is as follows:

Date	Description	Miles	Airfare	Train	Hotel	Breakfast	Lunch
10/1/93	San Francisco, CA Editor's Day						
10/2/93	San Francisco, CA Editor's Day						
10/3/93	San Francisco, CA Editor's Day						
10/4/93	San Francisco, CA Editor's Day						
10/5/93	San Francisco, CA Editor's Day						
10/6/93	San Francisco, CA Editor's Day						
10/7/93	San Francisco, CA Editor's Day						
10/8/93	San Francisco, CA Editor's Day						
10/9/93	San Francisco, CA Editor's Day						
10/10/93	San Francisco, CA Editor's Day						
10/11/93	San Francisco, CA Editor's Day						
10/12/93	San Francisco, CA Editor's Day						
10/13/93	San Francisco, CA Editor's Day						
10/14/93	San Francisco, CA Editor's Day						
10/15/93	San Francisco, CA Editor's Day						
10/16/93	San Francisco, CA Editor's Day						
10/17/93	San Francisco, CA Editor's Day						
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10/27/93	San Francisco, CA Editor's Day						
10/28/93	San Francisco, CA Editor's Day						
10/29/93	San Francisco, CA Editor's Day						
10/30/93	San Francisco, CA Editor's Day						
10/31/93	San Francisco, CA Editor's Day						



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10/31/93	San Francisco, CA Editor's Day						

tributed across a network, something not covered by the Component Object Model (COM) in OLE. IBM says that DSOM complies with the Object Management Group's CORBA (Common Object Request Broker Architecture), an industry standard for distributing and using objects across multiple platforms. Backers also say OpenDoc will not suffer from OLE's limitations on the size of embedded objects.

The OpenDoc standard itself calls for applications to be divided into parts. Thus, unlike OLE 2.0, all applications are automatically both containers and servers. Parts can come in one of two flavors: viewers (which let anyone who receives a document view all of the objects within it) and editors (which actually let you edit the objects). In this model, the viewers would be freely distributed, while the editors would be licensed like today's

chart "Object Linking Goes Head to Head.")

MACRO LANGUAGES

A flood of new and updated cross-application macro languages provides another route to integrating applications. These languages let you automate specialized tasks by calling functions in several applications and passing data among them. For instance, you might have a macro that dials up an on-line service, downloads stock quotes and news stories, moves the quotes into a spreadsheet, compares the results against a database, graphs the changes, and embeds the graph in a word processing document. In this scenario, individual programs are building blocks in user-created compound applications.

Macro languages are not a completely new idea. Keystroke macro recorders have been around for a long time, even

and procedures, so they could be scripted by other languages as well. An early version of LotusScript is included in Lotus Improv. Computer Associates has announced plans for its CABLE language, a subset of its CA-Realizer, to be added to all of its major applications to allow them to communicate with one another. Borland has unveiled plans for a Pascal-derived, OLE 2.0-aware language called Object Automater cross-application macro.

NETWORK INTEGRATION, NETWORK OBJECTS

Application integration on the network is a step behind the desktop, but new standards promise some relief. Some address basic communications problems, while others tackle the problem of object exchange.

On the mail front, two competing standards—MAPI and the VIM API—let de-



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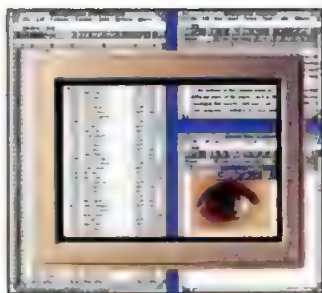
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COVER STORY

Applications Integration

velopers mail-enable their applications so users can send mail messages directly from within their word processor or spreadsheet. While initially the two groups were very competitive, most application vendors are now supporting mail engines that support either standard.

We're also seeing a number of APIs for letting applications talk to database data, typically data on a remote server stored in SQL (structured query language) databases. Microsoft has implemented a data-access specification called Open Database Connectivity (ODBC) in many of its products. Borland and others have proposed a competitor called the Independent Database API (IDAPI). Other vendor-promoted specifications include Lotus's DataLens and Oracle's Glue. Whatever the API, the result is the same: Most of today's end-user databases and even spreadsheets can access local and remote data from a variety of sources.

For the average user, the most interesting networking trend is in technologies for exchanging parts of a document over a network, technologies that go far beyond typical DDE linking.

Using Lotus Notes, for example, you can create a database of objects that are either complete documents or just parts of documents, such as spreadsheet ranges. Then, using a feature called Notes Field Exchange (Notes F/X), changes you make to an object can be reflected in another user's applications. For instance, if a spreadsheet range changes, new totals can be reflected in both a Notes document and other documents that call the field.

Borland takes a different approach in its Object Exchange (OBEX) technology, which originally shipped in the workgroup editions of Quattro Pro for Windows 5.0 and Paradox for Windows 4.5. Using OBEX, you can choose to "publish" information, such as a spreadsheet page, and other users can choose to "subscribe" to that information. In that sense, they get a new issue of this page every time the first user chooses to publish those changes. What makes OBEX unique is that it works over a wide variety of messaging systems, including both LAN e-mail packages and public services such as MCI Mail. This means you could send an MCI Mail message with new information that would automatically up-

date the subscriber's document. Borland is working with WordPerfect to bring OBEX features to WordPerfect and promises developers' kits and add-ons for other applications.

TOWARD AN OBJECT-ORIENTED DESKTOP

As applications and documents get broken down into their component parts, tracking those objects and integrating them with the operating system's desktop will become more and more important. Finding objects may take on the importance that finding files takes on today.

We've already seen several products that address this issue. Hewlett-Packard's NewWave was a pioneer in that direction, although probably before its time. IBM OS/2's Workplace Shell already has some of these features, such as "shadows" to allow multiple linked copies of the same document to reside in different desktop locations. NeXT's NeXTStep operating system is among the most advanced in this respect, offering both an object-oriented programming environment and a method for searching for objects based on their contents, not on filenames.

Microsoft's plans in this direction include more object-tracking features in upcoming versions of Windows (Chicago, or Windows 4.0, and NT's successor, Cairo). IBM plans to add more object-oriented features to OS/2 by adding frameworks developed by Taligent, which is also creating a new operating system that is completely object-oriented.

THE ROAD TO INTEGRATION

Application integration has long been a goal of software developers, but only recently have we had the operating systems, standards, application software, and programming tools to make this a reality. This is a big change—both for developers, who have to rethink and rework their applications, and for users, who will learn to think in terms of documents created and edited with multiple tools.

This may prove to be an even bigger shift than the change from running single DOS programs to multitasking in Windows or OS/2, and one that may take a while to become commonplace. But once it does, the concept of application-centric data, perhaps even of standalone applications, will be changed for good. □

WINDOWS APPLICATION SUITES

Suite Deals

It all started as a marketing gimmick. Back in 1988, someone at Microsoft decided to put the company's Macintosh-based word processing, spreadsheet, and presentation graphics packages into a single box, label it Office, and sell it at an aggressive price. Thus was born the office application suite. Microsoft followed up shortly thereafter with a similar bundle containing the Windows versions of Excel, PowerPoint, and Word. Competitors joined the fray and the race was on.

Lotus Development Corp. entered the market with Lotus SmartSuite for Windows, which contained Windows versions of Ami Pro, Freelance Graphics, Lotus 1-2-3, and a client license for cc:Mail. Borland International, which had a strong spreadsheet and database but no word processor, teamed up with WordPerfect Corp. and its leading word processor to offer Borland Office: Windows versions of WordPerfect, Paradox, and Quattro Pro.

The suites have evolved since their introduction. Microsoft added a Microsoft Mail client to the Office mix and subsequently released a new package, Microsoft Office Professional (reviewed here), which, in addition to all the components of



Save a bundle of money on a bundle of software *and* shake hands with the future! Today's office suites embody the cutting edge of applications-integration technology.

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by Michael J. Miller

Windows Application Suites

the standard version, includes the database package, Microsoft Access. In creating Lotus SmartSuite 2.1 (reviewed here), Lotus replaced cc:Mail with Lotus

Approach for Windows, its newly acquired end-user database product. Borland Office 2.0 still contains the same applications as Version 1.0, but all three have undergone significant upgrades, as have those in the Microsoft and Lotus suites.

The bottom line is that today most Windows users can buy their favorite applications bundled with a generous selection of other applications at bargain prices. This is already making a big impact in the marketplace. Microsoft claims that Microsoft Office now accounts for more than half of its current sales

of Excel and Word. Lotus estimates that about a third of its copies of Lotus 1-2-3 go out the door in a Lotus SmartSuite box. Building on the success of Lotus SmartSuite for Windows, Lotus has recently released a SmartSuite for OS/2.

But the bundling scheme was just the beginning. With the rise of the suite grew the idea that a bundle of applications should equal more than the sum of its parts—that a suite should add value of its own in the form of integration and interoperability. In making the parts of its suite work well together, each vendor has pursued its own specific vision of integration,

but all vendors draw upon the same basic building blocks:

- Interface consistency (standardized layouts and operation of menus, icon bars, and dialog boxes).
- Effortless data sharing (through DDE, OLE, query tools, and messaging techniques).
- Shared resources (like spelling dictionaries and charting and drawing modules).
- Quick access to any application from any other.

It's still early in the integration wars, but it's already clear that competition in this area is going to benefit all of us by enriching our software toolset. With every release, the applications in Borland Office, Lotus SmartSuite, and Microsoft Office are (to varying degrees) growing in power and efficiency from the synergy of integration.

THE SUITE SURVEYED

Market numbers show that suite sales are hot today, but what's actually driving them? A good deal on a load of software? A single best-of-breed application with bonus goodies thrown in essentially for free? A set of tools that work well together? A single-vendor solution?

Seeking answers to this question, *PC Magazine* recently mounted an on-line survey on the ZiffNet editorial forum. More than half the respondents were individuals who not only make their own purchasing decisions but influence the decisions of their organizations as well. Here's some of what we learned:

- The single biggest reason for suite purchases today is value; suites really are good bargains. More than 40 percent of respondents identified this as their number-one consideration.

FEATURES PLUS

From January 31 through February 3, you can join associate editor Ted Stevenson and PC Labs' technical director Ben Z. Gottesman in a discussion of the pros and cons of software suites on ZiffNet's Executives Online. Just type GO EXEC at any ZiffNet or CompuServe prompt.

■ Meet the Suites

**Borland Office for Windows, Version 2.0**

Borland International Inc.,
1800 Green Hills Rd., Scotts Valley, CA
95067; 800-331-0877, 408-438-8400;
fax, 408-439-8088

WordPerfect Corp., 1555 N. Technology
Way, Orem, UT 84057; 800-451-5151,
801-225-5000; fax, 801-222-5077

Price: \$595.

Requirements: 16MB minimum (80MB maximum)
hard disk space, 4MB RAM, Microsoft Windows 3.1.

Includes:

- WordPerfect 6.0 for Windows;
- Quattro Pro for Windows 5.0, Workgroup Edition;
- Paradox 4.5 for Windows, Workgroup Edition.

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**Lotus SmartSuite 2.1 for Windows**

Lotus Development Corp.,
55 Cambridge Pkwy., Cambridge MA
02142; 800-343-5414, 617-577-8500;
fax, 617-693-3981

Price: \$795.

Requirements: 27MB minimum (62MB maximum)
hard disk space, 4MB RAM, Microsoft Windows
3.0 or later, EGA or better resolution.

Includes:

- Ami Pro for Windows, Version 3.01;
- Lotus 1-2-3 for Windows, Release 4.01;
- Lotus Approach for Windows, Release 2.1;
- Freelance Graphics for Windows, Release 2.01;
- Lotus Organizer, Release 1.17.

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Our Contributors: MICHAEL J. MILLER is the editor-in-chief and ROBIN RASKIN is the editor of *PC Magazine*. SHERYL CANTER is an independent software developer and contributing editor of *PC Magazine*. EDWARD MENDELSON and CRAIG STINSON are contributing editors of *PC Magazine*. LORI GRUNIN is a frequent contributor to *PC Magazine*. TED STEVENSON was the associate editor in charge of this story, and BEN Z. GOTTESMAN was the project leader.

- Application integration and interoperability fall right behind value as purchase motivators.
- Availability of a key, best-of-breed application with supporting applications is a close third.

Here we review the individual applications that make up Lotus SmartSuite 2.1 and prerelease versions of Borland Office 2.0 and Microsoft Office Professional 4.0, so you can see how the word processing, spreadsheet, database, and presentation graphics programs compare one-on-one. (Borland Office does not include a presentation graphics package, per se, but its Quattro Pro for Windows, Version 5.0, offers notable presentation prowess.) Since integration is clearly a critical issue, we devote an entire section of the story to evaluating each suite's overall integration. Read on and find the suite of your dreams.



Microsoft Office Professional, Version 4.0

Microsoft Corp., One Microsoft Way, Redmond, WA 98052; 800-426-9400, 206-882-8080; fax, 206-936-7329

Price: \$995.

Requirements: 24.5MB minimum (62MB maximum) hard disk space, 4MB RAM (6MB recommended), Microsoft Windows 3.1.

Includes:

- Microsoft Word for Windows, Version 6.0;
- Microsoft Excel, Version 4.0 (with free upgrade to Version 5.0);
- Microsoft Access, Version 1.1;
- Microsoft PowerPoint, Version 3.0 (with free upgrade to Version 4.0);
- Microsoft Mail, Version 3.2 (server edition required).

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Word Processing

INTRODUCTION AND REVIEWS BY EDWARD MENDELSON

Suite shoppers need to look at word processing packages from two perspectives: which is the best standalone product and which is the best when used in the context of a suite. Ami Pro for Windows, Version 3.01, comes with a group of sophisticated macros for exchanging data with other Lotus SmartSuite applications and for using the Lotus 1-2-3 engine to perform calculations within the word processor. Ami Pro also benefits from tight integration with Lotus Notes.

Microsoft Word for Windows, Version 6.0, is the best-designed and most automated word processing program on the market and makes superb use of OLE 2.0 support for seamless integration with Microsoft Excel and Microsoft PowerPoint. Word's interface is so similar to that of the other programs in its suite that you may well forget you're using Excel to edit a table in Word.

WordPerfect 6.0 for Windows contains more built-in features than any other word processor, including a substantial spreadsheet. Information-sharing among separate users via the Workgroup Desktop is the principal integration feature connecting WordPerfect with Borland Office. Also, users can choose between a WordPerfect- and Borland-style interface.

More than ever before, word processing packages serve as containers for data you produce in other applications. Eventually, their programming languages will run those applications for you. And some of the languages in today's word processing packages may soon be extinct. Word's WordBASIC language will someday be supplanted by Microsoft Visual Basic, Applications Edition, which many Microsoft applications will share. Ami Pro's macro language will be joined by LotusScript, the new shared language for Lotus programs. WordPerfect's current language may have the most staying power, as it will become the basis of a language shared by all WordPerfect applications, including WordPerfect Office for PC Networks.

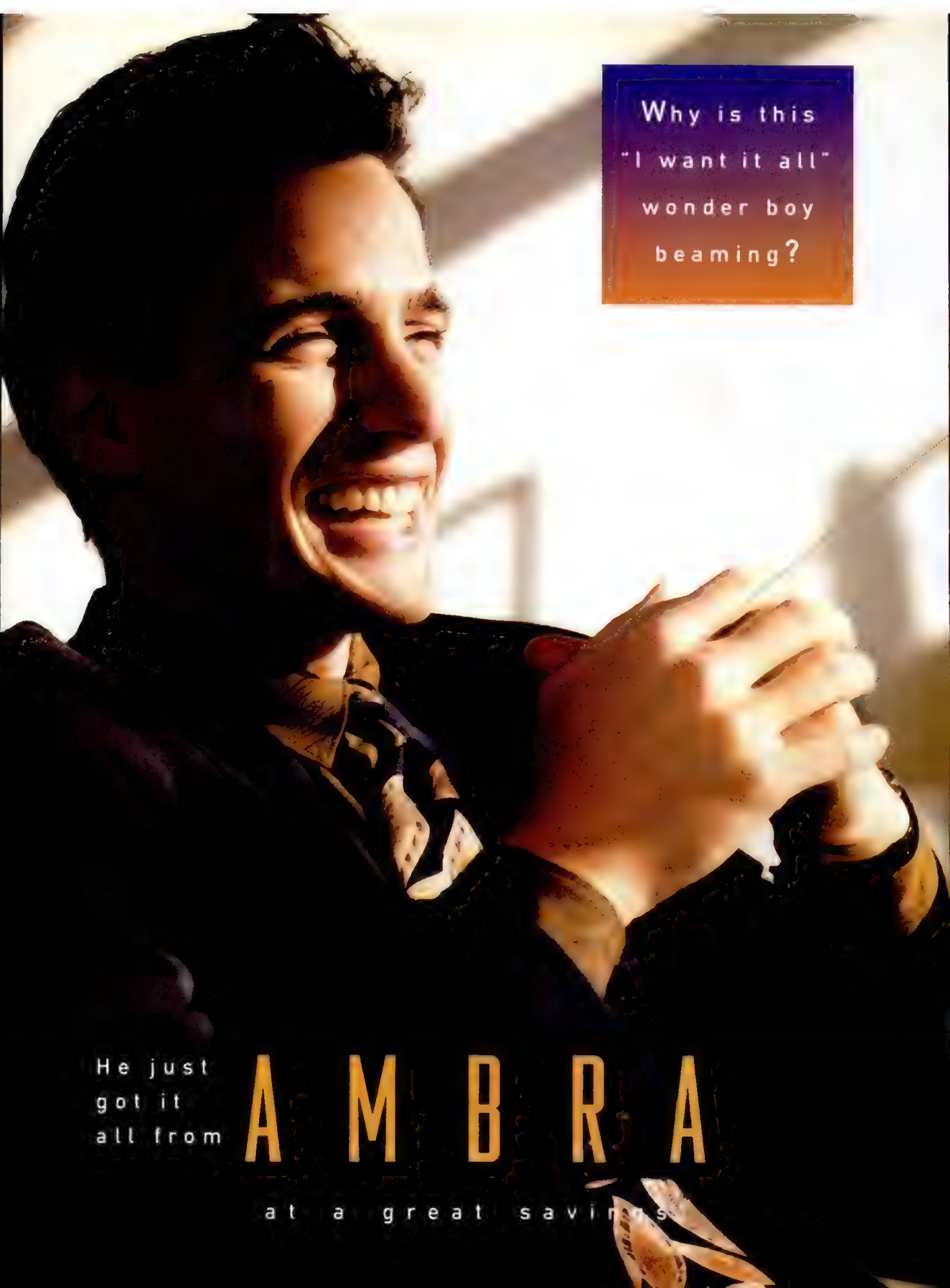
Borland International Inc./WordPerfect Corp.

Borland Office for Windows: WordPerfect for Windows

WordPerfect 6.0 for Windows is more a giant industrial plant for producing documents than a mere word processing package. WordPerfect Corp. designed its flagship product to do much of the work of an application suite all by itself. Its graphics functions surpass those of many desktop publishing programs, its table function is really a built-in spreadsheet with almost 100 analytic functions, and its text-retrieval module lets you access huge masses of data in seconds. It isn't the last word in elegance, and its appetite for memory and hard disk space is ravenous, but it does have a greater depth and range of functions than any other word processor on the market.

WordPerfect's paragraph- and page-formatting powers now equal or surpass those of rival packages, although even advanced users may have difficulty manipulating the awkward formatting codes when customizing certain options. WordPerfect has no equal in managing disks and data. The QuickFinder feature, which creates easily updated indexes of your files, lets you perform fast Boolean searches for text or document information fields. The unique QuickList feature lets you assign descriptive names to directories or file specifications. QuickFinder and QuickList appear in every dialog box from which you can open a file along with lengthy, descriptive filenames. Also available is a viewer that lets you search and select text in viewed files.

Everything in the package is built to help manage large projects. When you open WordPerfect, it can automatically reopen all files in use when you last closed it. Also, the envelope addresser uses a database of mailing and return addresses. When you use the automated templates



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- 128KB processor cache
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- 3.5" 1.44MB diskette drive
- 440MB hard disk
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- 6 drive bays
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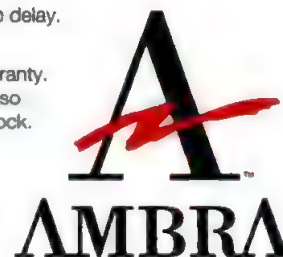
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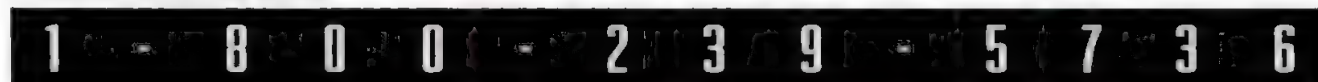
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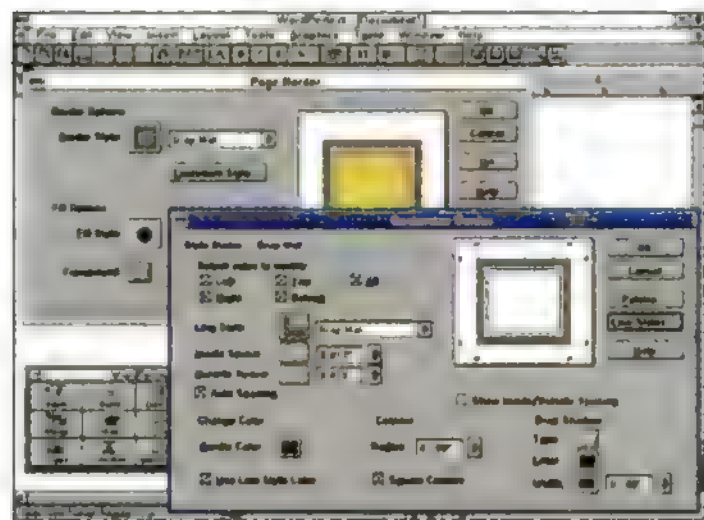


EDITORS' CHOICE

• A category under construction

for creating faxes, letters, and other standard documents, you can choose recipients from a built-in database. Merge functions are less elegantly implemented than they are in Word but more so than they are in Ami Pro. WordPerfect's strong point here is that it lets you mark individual records for use in a merge as an alternative to using standard selection criteria. A simple option lets you print envelopes for merged letters. The database import menu lets you log on to a SQL database and type in SQL queries.

WordPerfect's Master Documents—"container" documents used to manage chapters in larger projects—are simple. Any file can contain multiple sets of page numbers, chapter numbers, and volume numbers, and you can print a chapter in a



The unique desktop-publishing tools in WordPerfect for Windows include complex gradient fills and customizable borders.

file using a few keystrokes. WordPerfect's native printer drivers—which you can use instead of Windows drivers—let you use the document "joggers" that separate print jobs on high-volume printers.

Spreadsheet-strength tables support named ranges, and you can create a "floating cell" anywhere in your text that will display the current value of any cell in a table. The equation editor remains an awkward code-based module inherited from WordPerfect for DOS.

An OLE-enabled drawing module builds charts and vector graphics, and imports images from Twain-supported scanners. WordPerfect is the one word processor that wraps text around the irregular outline of a vector graphic. Brightness and contrast controls let you adjust imported images and graphics created in the program. Customizable borders and fills include complex gradients,

Windows application suites are currently under construction—and likely to remain that way indefinitely—since they are in fact compilations of other products, each with a life of its own, and each with a different development, upgrade, and release cycle. Though the rise of the

suite phenomenon has brought us high-quality applications at attractive prices and has undoubtedly spurred the cause of applications integration, the results to date have been suites that don't show nearly the level of integration we would like to see.

BORLAND OFFICE FOR WINDOWS

Given the market momentum that Microsoft Office Professional, Version 4.0, and Lotus SmartSuite 2.1 for Windows have developed, Borland and WordPerfect really had little choice but to band together to create their own competitor. As such, Borland Office for Windows, Version 2.0, is notable for both where it succeeds and where it fails. The suite's three components—WordPerfect 6.0 for Windows; Quattro Pro for Windows, Version 5.0, Workgroup Edition; and Paradox 4.5 for Windows, Workgroup Edition—are very strong individual competitors, with each offering unique and powerful features: WordPerfect's QuickFinder utility and built-in spreadsheet; Quattro Pro's top-flight graphics ability; and Quattro Pro and Paradox's shared Database Desktop. But these packages

still feel like just that: strong individual programs.

Nonetheless, we're impressed by how far the Borland Office package has come in a short while. The more consistent icons, the common install program, and the Desktop Application Director (DAD) with its ability to launch and switch among multiple applications all help move Borland Office toward that suite feeling.

This suite's most innovative achievement is the way all three of its components share data via Borland's Object Exchange and Workgroup Desktop. The OBEX technology still has some limitations, but it does offer an interesting way for people (perhaps running different applications) to share information. It also incorporates version control.

LOTUS SMARTSUITE FOR WINDOWS

Of the packages actually shipping, Lotus SmartSuite is both the most complete and the best integrated. Its components—Ami Pro for Windows, Version 3.01; Lotus 1-2-3 for Windows, Release 4.01; Freelance Graphics for Windows, Release 2.01; Lotus Approach for Win-

and if you plan to print in photographic-quality color, you can assign descriptive names to individual colors and then select them by name. An OLE-enabled "TextArt" module licensed from Bitstream stretches text on a curve and adds shadows and colors.

WordPerfect's customization features practically let you build your own screen display. You can decide which fields appear on the status bar and adjust the size of each. You can customize the file

lists in dialog boxes to include any combination of field types.

Unlike Word, WordPerfect doesn't let you customize the context-sensitive menus that pop up when you click the right mouse button. But you can assign any program to a custom button on a toolbar. A font-mapping menu lets you decide which fonts to display on-screen to match fonts built into your printer. All document views are editable, and you can create headers in Page view simply by click-

dows, Release 2.1; and Lotus Organizer, Release 1.17—cover more needs for the typical user than do the suites from its competitors. It has not only a presentation graphics package and a database package that are easy to use but also—unique among the suites—a PIM. But Lotus SmartSuite appears here at some disadvantage because, as of this writing, Ami Pro and 1-2-3 are the oldest word processing and spreadsheet packages, respectively. Both are strong programs, but in the leap-frog world of software they are not currently leading the pack.

On the surface, Lotus SmartSuite, with its SmartIcons and status bar, offers great interface consistency. But this commonality doesn't go far beneath the surface. The newer programs such as Approach and Organizer use their icons in very different ways than do Ami Pro and 1-2-3. Approach's status bar also differs from that of the two stalwarts—and Organizer has no status bar at all. Even Ami Pro and 1-2-3 don't work as similarly to each other as one might hope. The Working Together Bonus Pack—new Ami Pro macros for better integrating the components and switching among them—does point the way to tighter integration in the future. And we eagerly await new releases of these components.

MICROSOFT OFFICE PROFESSIONAL

Microsoft has probably achieved the greatest interface consistency among its applications, at least among the newly revamped Microsoft Word for Windows, Version 6.0; Excel, Version 5.0; and PowerPoint, Version 4.0. The big

problem is, that's not what's really shipping now in the Microsoft Office box. Instead, you get Word 6.0, some older applications, and a couple of coupons.

Users get Microsoft Access, Version 1.1, in Microsoft Office Professional—though it's not in Microsoft Office. Both suite versions include a client license for Microsoft Mail, Version 3.2. As of this writing, Excel 5.0 is nearly finished, and it does promise much tighter integration with Word than that of any other spreadsheet-word processor combination we've seen. These two are harbingers of the way applications should work together, particularly in their use of OLE for drag and drop; control of Word from Excel's Visual Basic, Applications Edition (VBA), macro language; and icons that let you place an Excel worksheet in a Word document.

Unfortunately, at this point, PowerPoint isn't nearly far enough along to be accurately judged. Access and Mail share some interface design with the other suite components, but they are not nearly as well integrated.

Where the Microsoft suite currently falls notably short of the others is in workgroup support. The Mail license is a nice deal for shops that use Mail, although it doesn't help if you use a different mail system. Beyond that, Microsoft does not currently offer a technology comparable to Lotus Notes or Borland's OBEX.

On the other hand, when PowerPoint ships, Microsoft will almost certainly have the best integrated set of word processing, spreadsheet, and graphics applications. These programs will likely set

the standard by which other integrated packages will be judged.

SUITES OR STANDALONES

Unquestionably, suites can be a good deal for users who want multiple programs or for organizations buying multiple applications for each of their users.

But suites should do more: You need consistency of interface and function among suite applications, so you don't have to learn three, four, or five separate programs and approaches to working. And you need the integration of the individual pieces so that they form a whole greater than the sum of its parts. At this writing, all three suites offer a glimpse into the future, but none really deliver on that promise. Yes, menus and icons are getting more consistent, and we are seeing some integration among components. But none of the suites have given us integration as deep, solid, and pervasive as it needs to be.

And the advantage of new technologies such as Object Linking and Embedding and OpenDoc (see the introduction, "Application Integration: Getting It Together") should be that they allow many applications from many vendors to work together. This should eventually create a baseline of integration that will let individuals or workgroups compile their own suites of "best-of-breed" components that work best for them. That may ultimately turn out to be the best suite of them all. For now, despite the new push toward integration, the best applications still don't come from any one vendor.

ing on the right mouse button. Version 6.0 will not let you remap your entire keyboard, as you could in earlier WordPerfect products, but an early maintenance release will restore full control over key assignments.

Copies of WordPerfect that ship with Borland Office use WordPerfect's native icons and button bars; a menu choice lets you change these to the Borland-style equivalents throughout the suite. The Workgroup Desktop in Borland Office

lets WordPerfect "subscribe" to spreadsheet and database information "published" by users of the workgroup editions of Quattro Pro for Windows and Paradox for Windows. Object Exchange (OBEX) delivers such communications via various e-mail protocols and MCI Mail.

WordPerfect still won't let you search for bold text and replace it with italics without writing a macro, and advanced paragraph numbering in Version 6.0 is disas-

trously awkward compared with the procedure in Version 5.x. The initial release tends to be sluggish in systems with less than 8MB of RAM. But WordPerfect remains the program to choose when you need to do a complex job. Version 6.0 is the first WordPerfect package that feels fully at home in Windows, and it continues to offer WordPerfect's unique combination of cross-platform consistency, advanced formatting, and unparalleled control over masses of data.

Suitability to Task

For details on how we rated the suites' integration capabilities, see the sidebar "How We Evaluated Suite Integration." To rank the word processors, we used the same tasks as were used in the word processing roundup in our issue of November 9, 1993. We reevaluated two products since revised: Word and WordPerfect. To rank spreadsheets, we used the same tasks as were used in the spreadsheet review in our issue of

January 11, 1994. The only product updated since that review is Excel. To rate presentation graphics packages, we used criteria from our issue of November 10, 1992, to assess Quattro Pro and updates of Freelance and PowerPoint.

Because suites' database programs vary greatly from nonprogrammable (Approach) to highly programmable and customizable (Paradox), we used new end-user database tasks. In **quick**

application development, we looked at how programs function when used without macros and programming. In **customized application development**, we measured the products' ability to create professional quality applications. In **front-end development**, we looked at their ability to access a variety of external database types. In **analysis and charting**, we looked at tools for gaining insight into data, such as crosstabs.

	Borland Office for Windows		Lotus SmartSuite for Windows		Microsoft Office Professional	
INTEGRATION						
Installation/shared modules	GOOD		FAIR		GOOD	
Consistency	FAIR		GOOD		EXCELLENT	
Data sharing	POOR		FAIR		GOOD	
Workgroup integration	GOOD		GOOD		FAIR	
	POWER	EASE	POWER	EASE	POWER	EASE
WORD PROCESSING						
	WordPerfect for Windows		Ami Pro for Windows		Microsoft Word for Windows	
Letters	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT
Business reports	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT
Newsletters	EXCELLENT	EXCELLENT	EXCELLENT	GOOD	EXCELLENT	EXCELLENT
Long technical documents	EXCELLENT	EXCELLENT	GOOD	GOOD	EXCELLENT	EXCELLENT
SPREADSHEETS						
	Quattro Pro for Windows, Workgroup Edition		Lotus 1-2-3 for Windows		Microsoft Excel (beta version)	
Analysis and model building	EXCELLENT	EXCELLENT	EXCELLENT	GOOD	EXCELLENT	EXCELLENT
Charting	EXCELLENT	EXCELLENT	GOOD	EXCELLENT	EXCELLENT	EXCELLENT
Worksheet presentation	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT
Interoperability	EXCELLENT	EXCELLENT	EXCELLENT	GOOD	EXCELLENT	EXCELLENT
Application development	EXCELLENT	EXCELLENT	GOOD	GOOD	EXCELLENT	EXCELLENT
Workgroup support	EXCELLENT	GOOD	EXCELLENT	GOOD	GOOD	EXCELLENT
DATABASES						
	Paradox for Windows, Workgroup Edition		Lotus Approach for Windows		Microsoft Access	
Quick application development	GOOD	GOOD	EXCELLENT	GOOD	EXCELLENT	GOOD
Customized application development	EXCELLENT	GOOD	FAIR	GOOD	GOOD	EXCELLENT
Front-end development	GOOD	FAIR	GOOD	EXCELLENT	EXCELLENT	EXCELLENT
Analysis and charting	EXCELLENT	EXCELLENT	N/A❶	N/A❶	GOOD	EXCELLENT
PRESENTATION GRAPHICS						
	Quattro Pro for Windows, Workgroup Edition		Freelance Graphics for Windows		Microsoft PowerPoint (beta version)	
Text charting	FAIR	GOOD	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT
Data charting	EXCELLENT	GOOD	GOOD	FAIR	N/A❶	N/A❶
Illustration and annotation	FAIR	FAIR	GOOD	GOOD	FAIR	GOOD
Hard-copy presentations	FAIR	GOOD	GOOD	EXCELLENT	GOOD	GOOD
Electronic presentations	GOOD	GOOD	GOOD	GOOD	N/A❶	N/A❶
Presentation management	POOR	FAIR	GOOD	GOOD	EXCELLENT	GOOD

N/A●—Not applicable: The product does not perform this task. N/A●—Not applicable: Since the product code was not finished at press time, we could not rate this feature.



(America Online)

Lotus Development Corp.

Lotus SmartSuite for Windows: Ami Pro for Windows

Much of the kind of integration that Windows applications will achieve through OLE 2.0 has always been built directly into Ami Pro. As a result, Ami Pro—including its latest incarnation, Version 3.01—can do entirely on its own much of the work that other word processors can do only with the help of companion programs.

Ami Pro was designed from the start to combine text and graphics, so its tools for editing pictures, charts, equations, and tables don't feel like add-ons—the way similar tools do in other major Windows word processors. Graphics and tables are as easy to manipulate as text. For example, after entering data into a table, you can copy it to the clipboard, turn on the charting module, and immediately create a chart from your data. You can then use the program's drawing tools to modify or add annotations, or you can attach a macro to the chart and execute it by clicking on the chart. The separate drawing, charting, and table functions in Microsoft Word for Windows and WordPerfect for Windows are not nearly as tightly integrated. On the other hand, Ami Pro's equation editor lacks the refinements included in that of Microsoft Word for Windows.

All tables, equations, and graphics in Ami Pro are stored in frames, and although you can't specify multiple frame styles as you can in WordPerfect, you can customize one frame style as your default. Once you create a frame, you can put anything in it, including multicolumn text or imported TIFF (Tagged Image File Format) images whose edges you can sharpen or blur using Ami Pro's built-in image-enhancement tools.

IT'S GOT STYLE

All text formatting in Ami Pro is built on stylesheets. You create and modify paragraph styles from the Style menu, which provides miniature previews of the selected options. You can access Ami Pro's format options in an extraordinary variety of ways. To select a paragraph style, for example, you can click on its name in the list that pops up from the status bar, you can use the mouse or keyboard to reach a floating window with another style list, you can press a function key assigned to any style, or, finally, you can click the right mouse button while editing text. Alternatively, you can access the main style menu either by using the mouse or via a keyboard shortcut.

Ami Pro relies so heavily on styles that you can't even adjust the space below a paragraph or change the width of an indent without creating a new style. Also, styles aren't hierarchical. Therefore, when you change a setting in, say, Normal Style, Ami Pro won't automatically replicate this change through other styles you created by modifying Normal Style. While it's true that Ami Pro doesn't allow the same degree of fine-tuning of, say, letter-spacing, numbering, and boxes that you get in Word and WordPerfect, it does offer more intuitive access to its features.

VIEWPOINTS

The default screen in Ami Pro displays a formatted page, complete with headers and footnotes. You create a header simply by clicking at the top of the page and entering text, and you edit footnotes simply by clicking inside the footnote text. You can view only one page at a time, so if

a sentence straddles a page break, you can't see the whole sentence on one screen unless you switch to Ami Pro's draft or outline view. In the outline view, you can select fonts from those that appear in normal view and on the printer

so you can see the structure of your work more clearly. Unlike Word and WordPerfect, Ami Pro doesn't include a keystroke that turns on select mode, so you can't extend text selection by using the Find and GoTo menus.

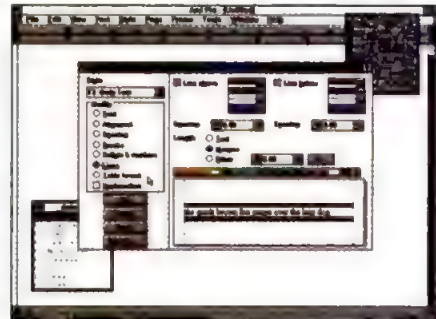
Ami Pro's merge functions are virtu-

ally effortless, with menus that guide you through all steps of creating data files and form letters. Ami Pro can extract merge records from most standard database and spreadsheet files, or use data from Lotus Organizer. If you store records in Ami Pro's native data format, you can create or modify them using a built-in database that looks like a card file.

NOTEWORTHY

Version 3.01 has been upgraded to include macros and other features that exchange data among Lotus SmartSuite applications, but the most impressive integration feature in this version is its intimate relation with Lotus Notes. When you embed an Ami Pro file into a Notes document using a new feature called Notes Application Field Exchange (also known as Notes F/X), other network users can search certain fields in the file and even change the contents of the fields remotely. No other word processor can match this impressive level of workgroup integration.

Version 3.x of Ami Pro was first released in 1992, and its word processing functions have begun to show their age, especially when compared with those in the shiny new versions of Word and WordPerfect. The Master Document feature, for example, confusingly lets you enter text that won't print. Moreover, some laconic menus lack on-line help,



In Ami Pro, users can access all paragraph formatting commands from a single, comprehensive menu.

*Ami Pro was designed
to combine text and
graphics, so its tools for
editing charts,
equations, and tables
don't feel like add-ons.*



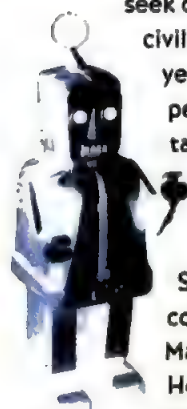
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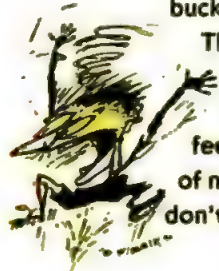
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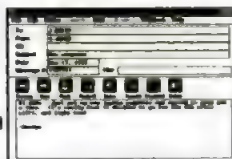
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CIRCLE 102 ON READER SERVICE CARD



How We Evaluated Suite Integration

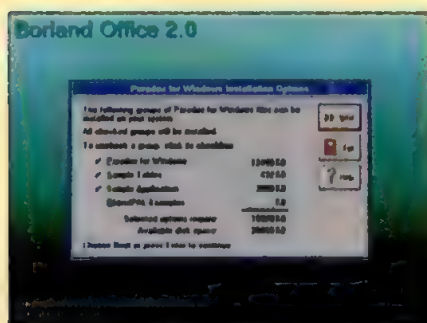
Application suites give you a lot of software for a modest investment, but what sets them apart—from other bundles and from one another—is integration. The more suite components work alike and the more freely they can exchange data, the more powerful a tool the suite becomes.

Installation and Shared Modules

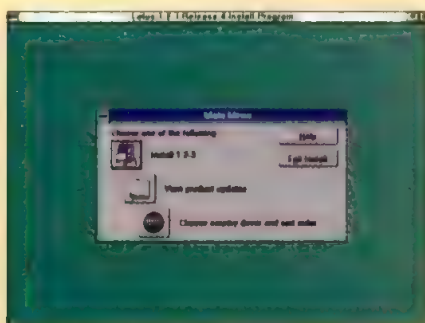
A truly integrated set of applications should have a single installation program from which the user can decide which applications to install. Every setup option available in standalone versions of each application should be accessible in the

unified installation program. When multiple applications share common modules, such as a spell-checker, the installation program should install these only once. The installation program should also provide an easy method for

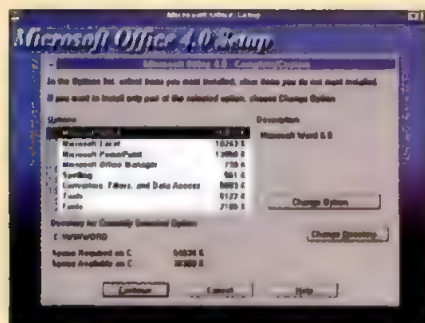
removing individual applications. Finally, the installation program should provide users with a simple means for moving among applications—ideally through a customizable shell program that is accessible at all times.



BORLAND OFFICE: Borland provides a single installation program for all three applications in the suite. It offers the full range of installation options available to standalone versions of the applications.



LOTUS SMARTSUITE: Lotus SmartSuite does not provide a common installation program. The separate installation programs for the individual applications do at least have a consistent look and feel.



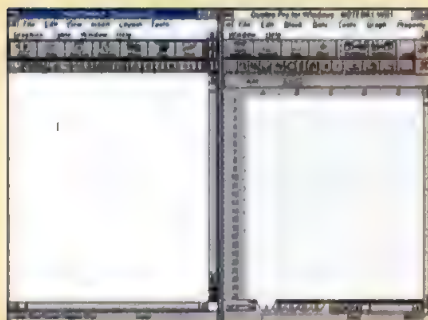
MICROSOFT OFFICE PROFESSIONAL: Microsoft provides a common installation program for the programs provided in the basic Microsoft Office product. Microsoft Access, however, must be installed separately.

Consistency

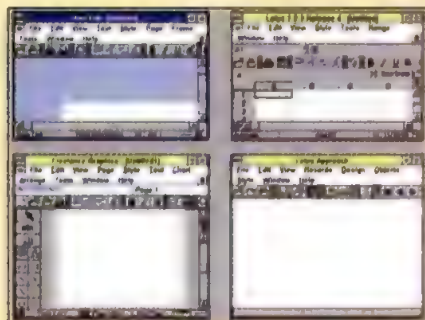
During testing, we looked at the degree to which the programs were designed to have a common look and feel. Wherever possible, menus and submenus

should be identical in order and content, toolbar icons should be found in the same locations, and dialog boxes should have the same controls and procedures.

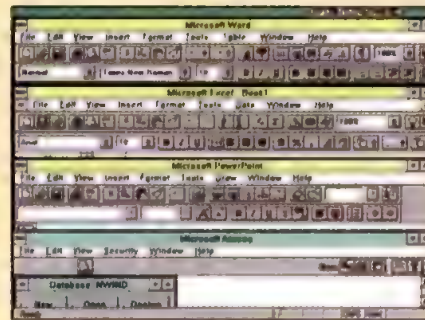
The benefit is that once you have learned an application in a suite, you will already be familiar with the operational basics of the suite's other applications.



BORLAND OFFICE: Quattro Pro for Windows can be configured with a WordPerfect button bar and power bar. The two programs' dialog boxes are dissimilar, however.



LOTUS SMARTSUITE: Lotus SmartSuite applications share a similar look and feel. They include SmartIcons and, with the exception of Lotus Organizer, a "live" status bar.



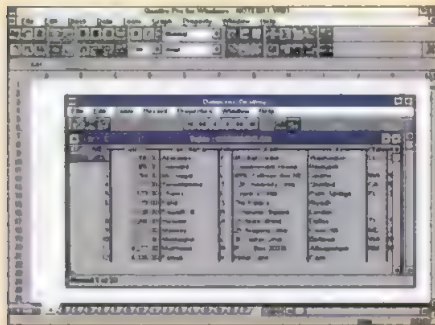
MICROSOFT OFFICE PROFESSIONAL: The design of menus and icon bars is highly consistent among Excel, PowerPoint, and Word for Windows.

Data Sharing

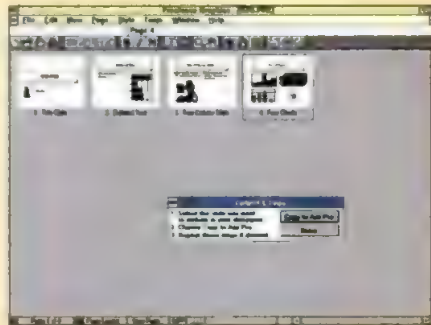
Suites can help change the user's focus from application-centered to document-centered. The applications making up a suite should be able to exchange both new and existing data easily. Some suite products already go far beyond the basic Insert Object and Paste Link commands common in most Windows applications.

The synergistic interchange of data among applications in an office suite should create a whole greater than the sum of its individual parts. The ability to move text, numbers, data records, charts, and pictures easily from one application type to another is a fundamental change that moves us away from our old application-centered way of thinking and

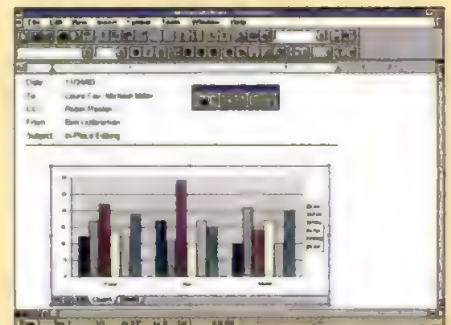
toward a new document-centered one. A number of new technologies are making this happen. OLE (developed primarily by Microsoft), especially Version 2.0, can make object-sharing among applications as easy as drag-and-drop. OLE also enables in-place editing, where you use one application's editing tools in the context of another application.



BORLAND OFFICE: Quattro Pro's Database Desktop lets you query a Paradox or dBASE table and place the results in the current notebook. Queries can be saved and reused.



LOTUS SMARTSUITE: With Collect and Copy, you can gather a selection of slides from a Freelance presentation and place them in an Ami Pro document.



MICROSOFT OFFICE PROFESSIONAL: OLE 2.0 support lets you edit Excel charts within a Word document. The menus and toolbar here are Excel's, not Word's.

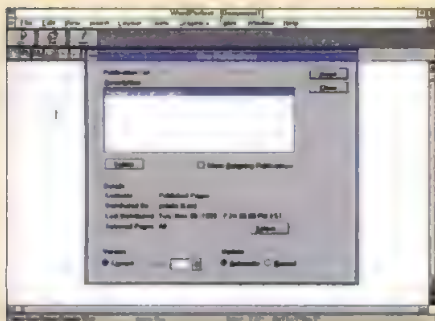
Workgroup Integration

Since today's users work less and less in a vacuum, it is becoming increasingly important that their software tools let them exchange data within a workgroup—whether that workgroup be in a single location or spread out across the country, connected only by phone lines.

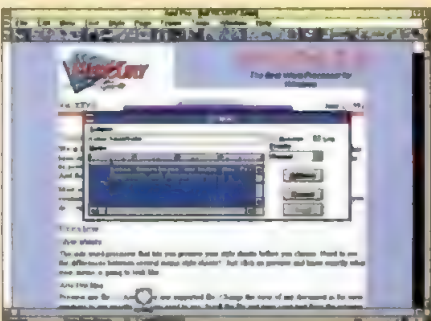
At a minimum, today's users require the convenience of being able to mail

documents and data files directly from within the applications in which they are working. More advanced features, such as version control and routing, can substantially expand upon these basic workgroup efficiencies. Ideally, you should be able to integrate data created in one application by another user into another application.

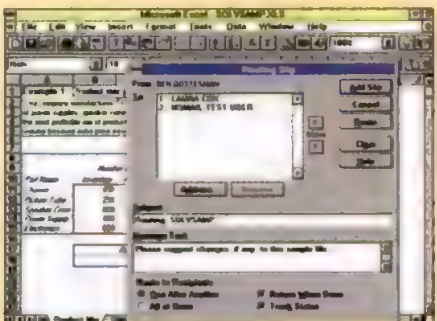
Finally, suite products should support established data-transport standards such as VIM, MAPI, and MHS. Object Exchange (OBEX) technology, a recent innovation from Borland, takes this idea a step further, allowing data to be shared across LANs (with or without the help of an e-mail package) and via MCI Mail.



BORLAND OFFICE: WordPerfect users can subscribe to one or many pages of Quattro Pro notebooks. The spreadsheets appear as WordPerfect tables.



LOTUS SMARTSUITE: Users can send mail directly from Lotus SmartSuite applications via cc:Mail, Lotus Notes, and—with the exception of Ami Pro—MAPI.



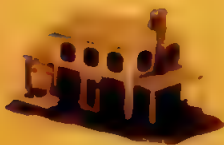
MICROSOFT OFFICE PROFESSIONAL: Users can attach routing slips when mailing Excel spreadsheets. The spreadsheets can then be sent simultaneously or in a sequence.



5



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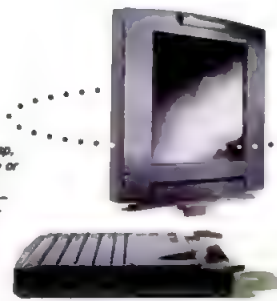
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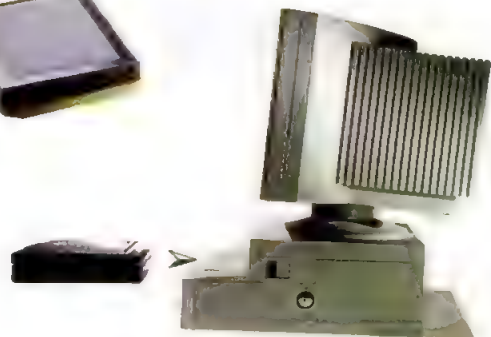
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CIRCLE 239 ON READER SERVICE CARD



NEC

and support for foreign and technical characters is awkward. But Ami Pro's straightforward interface remains easy to navigate for all essential word processing and graphics functions, and its integration into Notes makes it uniquely effective in a networked environment. Meanwhile, Lotus is currently working on a major upgrade to Ami Pro, scheduled for release in 1994.

Microsoft Corp.

Microsoft Office Professional: Microsoft Word for Windows

Microsoft Word 6.0 for Windows brings word processing to a level of automation, convenience, elegance, and power that other programs only dream of approaching. Word not only makes simple writing tasks easier than ever, it adds features that make complex tasks seem simple. And when Word itself can't perform a function, it offers seamless links to the programs in its Microsoft Office Professional suite that can. While Word suffers from minor design flaws left over from earlier versions, it as a whole stands out as the first of a new generation of word processors that automate the tedious work that the more primitive programs leave to the user.

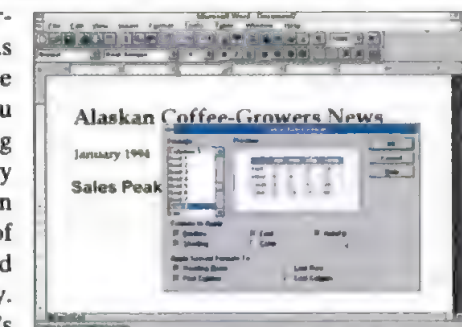
While Word continues to use stylesheets for formatting, you can now enter text without thinking about formats and simply let Word automatically style your whole document afterwards. The program uncannily recognizes headlines and bulleted lists, converts ASCII text with carriage returns at the end of each line into editable paragraphs, and transforms "neutral" quote marks into curly typographer's marks. Another intelligent tool reduces type size and spacing to make your text fit on a single page instead of running a few lines over to the next page. Some details remain rough in this release, however. Unless you tell it not to convert symbol characters, it will,

for example, overeagerly reformat the *th* in *500th* as a superscript. Also, you can use your custom stylesheets for automatic formatting only if they use Word's standard names for headings and normal text. Otherwise, you must redefine the name with an alias style.

FLYING CORRECTIONS

While you write, Word corrects common spelling mistakes and expands preset abbreviations on the fly. Earlier versions made you press a function key or use the menu to expand abbreviations, but the new release performs this feat as soon as you hit the Spacebar. When you encounter a spelling error in an ordinary spell check, you can add it to the list of errors that Word corrects on the fly.

Some of Word's automation features are for beginners, such as Letter Wizard, which helps you format prewritten business letters. Others—like Table Wizard, which creates complex table formats, and the feature that adjusts column widths to the size of your data—are for more-advanced users. Word's merge capabilities are now almost entirely automated, with full customization via menus



Word formats tables automatically, using the same easy-to-use tools used in Excel.

instead of programming. An option lets you merge to a "catalog" format with multiple records on a single page. Envelopes can include bar codes.

Word's screen finally offers all the up-to-date GUI features that you get in rival programs. It also introduces some of its own. Support for

Windows' Multiple Document Interface lets you iconize files, and you can drag-and-drop text between document windows. The product has multiple, easily customized toolbars, which speed up many tasks. For example, you can click on the Undo icon to an unlimited number of

editing actions in reverse instead of trying to find the action you're looking for from a cryptic list. Icons let you switch among normal, page, and collapsible outline views. You can edit text in all views, including a new view that displays thumbnails of multiple pages.

When you install Microsoft Excel, an Excel icon appears on Word's standard toolbar and lets you open an Excel spreadsheet directly in Word. Thanks to OLE 2.0, you can edit a chart in the same window that you edit Word's text, or drag a spreadsheet from Excel and drop it into

Word. Word's built-in database access is less flexible than that of WordPerfect for Windows, but if Excel is installed, you gain access to Microsoft Query, which provides total flexibility in database imports. Redlining and group editing are superbly imple-

mented; revision markings can be made invisible during editing and automatically color-coded by author. You can attach a routing slip to a document that's been sent via e-mail directly from Word's menu.

OLE server-only applets that come in the package let you work in the main editing window when creating drawings, equations, or decorated fonts called "WordArt." Word's equation editor, based on Design Science's MathType, is more powerful than the one in Ami Pro for Windows and more graphical than the one in WordPerfect. The graphing applet opens a separate window when you run it, because it supports OLE 1.0 only. A drawing "layer" that you can apply over or under Word's text lets you draw a shaded ellipse around a word, but the ellipse won't move when changes in your text alter the location of the word. You can create boxes with text that describes a graphic and have Word automatically draw lines from points in the graphic to the boxes.

ROOM FOR IMPROVEMENT

Some of Word's features are still incomplete. The program lacks the file man-

*Microsoft Word for
Windows not only makes
simple writing tasks
easier than ever, it adds
features that make com-
plex tasks seem simple.*



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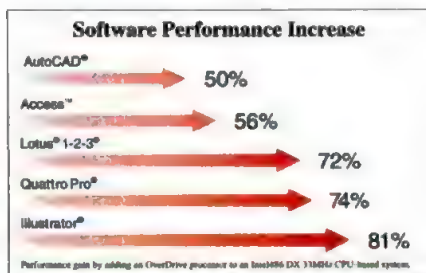
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CIRCLE 363 ON READER SERVICE CARD

agement and disk indexing capabilities of WordPerfect, and its graphics handling still doesn't equal its outstanding text handling.

Some features remain unintuitive, like the footnote separator line, which is visible only in page view but modifiable only in normal view. Other features, however, even those that are nightmarishly complicated in other software

packages (such as custom paragraph numbering), are virtually effortless and transparent in Word.

Although Word lacks some important features found in WordPerfect, it is far better automated and far more straightforward. Word is a stunning achievement, and it now ranks as probably the most elegant and powerful word processor ever written.

Spreadsheets

INTRODUCTION AND REVIEWS BY CRAIG STINSON

The spreadsheets in Borland Office, Lotus SmartSuite, and Microsoft Office Professional are all mature, full-featured products—easier to learn and use than their predecessors and with more analytical power and better workgroup support.

Borland and Microsoft lead the way on the ease-of-learning front. Quattro Pro for Windows, Version 5.0, Workgroup Edition, includes an unobtrusive balloon-help system, a set of training routines that work with the user's own data, and a set of Experts that guide users through some of the program's more advanced features. Microsoft Excel, Version 5.0, offers an ingenious Tip Wizard that watches your every keystroke and shows you the most efficient ways to get your work done.

The most dramatic analytic enhancements this year are Quattro Pro's Data Modeling Desktop and Excel 5.0's Pivot-Table Wizard. Both let you turn inscrutable database records into effective crosstabular reports. Like worksheets in Lotus Improv, the resulting tables are dynamic; you can slice and dice your data in myriad ways, just by dragging field headings.

Quattro Pro's Workgroup Desktop, the debut of Borland's OBEX (object exchange) technology, is the most impressive advance in the workgroup area. OBEX implements a publish-and-subscribe system of document sharing, which lets users send and receive data via several different transport mechanisms (including MCI Mail) and requires no additional software. Lotus added a workgroup-aware scenario manager to Lotus 1-2-3

for Windows, Release 4.0, and integrated the program tightly with Lotus Notes. Microsoft has enhanced Excel's e-mail support with document routing.

All of these products are heavyweights, but one—Excel 5.0—stands out for richness of features and ease of use. Excel 5.0 shines also in its support for OLE 2.0 (allowing in-place object editing, drag/drop data exchange with Microsoft Word for Windows, Version 6.0, and cross-application scripting via Visual Basic), its list-management services, and its simpler and richer charting module.

Borland International Inc./WordPerfect Corp.

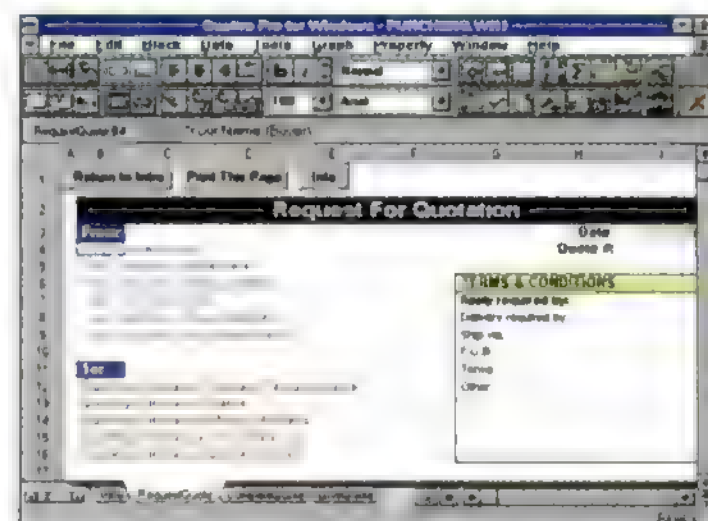
Borland Office for Windows: Quattro Pro for Windows, Workgroup Edition

The strongest features of Quattro Pro for Windows, Version 5.0, Workgroup Edition, are its elegantly usable notebook interface, its wealth of analytic commands and functions, and its publish-and-subscribe approach to workgroup communications. Aside from its DOS counterpart, Quattro Pro for Windows is the only spreadsheet that includes a fully functional slide-show utility. Though rudimentary when compared with Freelance Graphics and Microsoft PowerPoint, this utility may suffice if your presentation needs are occasional and casual.

The latest spreadsheets from Microsoft and Lotus have adopted Quattro

Pro's tabbed-page interface, but this approach to three-dimensional modeling is still most thoroughly implemented by the Borland product. You can name pages and use those names in formula references. Rearranging a set of pages is simply a matter of dragging tabs. And selected pages may be combined into named groups.

A second distinctive feature of the Quattro Pro landscape is the Object Inspector—a set of related dialog boxes that appear in response to a right mouse-click. To change the format of any object on your worksheet, you point to the object and press the right mouse button. Further, the right button can be used to execute other common actions too. And new Presentation Advisors help users design spreadsheets, graphs, and slides.



Named page tabs, displayed along the bottom of Quattro Pro's notebook window, add to the readability of multipage spreadsheets.

Borland's first revision of Quattro Pro for Windows (the version number was stepped up to 5 to achieve parity with Quattro Pro for DOS) provides a huge increase in the program's analytic horsepower. The function set is roughly tripled, with most of these additional functions applied in the areas of engineering, advanced financial analysis, and smarter date/time calculations. In addition to those new functions, Borland has added a suite of commands for such things as advanced regression analysis, descriptive statistics, moving averages, exponential smoothing, histograms, and rank-and-percentile analysis.

Other analytical improvements include array capability, better range-naming tools, a scenario manager, a subset of the analytic charting features that were introduced in Quattro Pro for DOS, Version 4.0, and a facility for building

Improv-like crosstab reports.

When you select a block of cells framed by column and row headings, Quattro Pro will create names based on those headings. The cell at the intersection of "December" and "COGS," for example, can automatically be named "December_COGS." (Excel has had this capability since its first version.) The array capability, meanwhile, allows you to encapsulate numerous calculations in a single formula, further improving your model's readability and saving memory to boot.

The scenario manager, while lacking 1-2-3 for Windows' ability to track input from multiple users, has a simple user interface and makes effective use of color to highlight cells that have changed and cells affected by changing cells. The consolidator rolls up ranges based on either row or column labels, whether the ranges are identically organized or not. The analytical graphing commands let you aggregate chart data, plot moving averages, and generate regression lines. The handy zoom-and-pan of Quattro Pro for DOS did not make it into Windows, however, and Quattro Pro for Windows' new "doughnut" charts—unlike those in Excel 5.0—do not accommodate multiple data series.

The Data Modeling Desktop lets you transform flat lists into tables that summarize information meaningfully. Like Improv worksheets and Excel 5.0 pivot tables, the DMD's output can be rearranged with simple drag-and-drop procedures. Items along either the row or the column axis can be grouped, with details showing or hidden, and the entire table can be sent back to the worksheet as either static or linked data.

For workgroup communication, the workgroup edition of Quattro Pro for Windows offers the Workgroup Desktop, a Macintosh-like publish-and-subscribe system for exchanging whole notebooks or individual pages with fellow workers. Documents can be transported via any of seven methods—MAPI, MHS, cc:Mail, MCI Mail, WordPerfect Office, Lotus Notes, or your LAN—and published to

any desired "revision depth." Unlike the Lotus workgroup features, which are based on Lotus Notes, the Borland approach requires no additional software.

In comparative testing with 1-2-3 for Windows, Release 4.01, and Excel 4.0, however, Quattro Pro's performance was the weakest by a considerable margin. The testing was done in the spreadsheet roundup in our issue of January 11, 1994. (Excel 5.0's performance scores were not available, because the program was still in beta). For querying on-sheet databases, moreover, Quattro Pro still relies on the criteria-range methods introduced a decade ago by 1-2-3 for DOS. (Users can now also use the flexible and easy-to-use Database Desktop to query external databases.) And as the result of an unfavorable court ruling, Quattro Pro is no longer able to run the keystroke sequences of 1-2-3 macros. All bracketed macro verbs work fine in Quattro Pro (Borland's macro language is a superset of that of Lotus 1-2-3 for DOS, Release 2.x), but macros that invoke the 1-2-3 menu tree will have to be modified.

Quattro Pro's for Windows' usability and analytic strength make it an attractive alternative to 1-2-3 for Windows. Macro writers moving up from any DOS spreadsheet, moreover, may find Quattro Pro an easier transition than Excel, because the latter's macro language is unlike anything in the DOS world. On the other hand, Quattro Pro lacks Excel 5.0's new list-management features, and its slow performance is cause for concern.

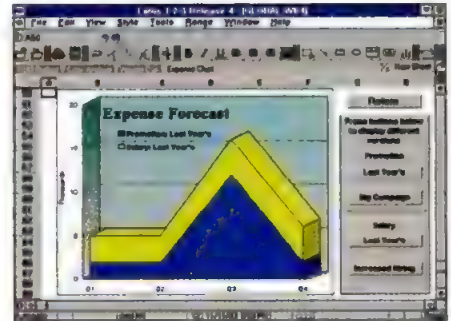
Lotus Development Corp.

Lotus SmartSuite for Windows: Lotus 1-2-3 for Windows

With the delivery of Lotus 1-2-3 for Windows, Release 4.01, Lotus Development Corp. has restored its credibility as a spreadsheet maker. 1-2-3 for Windows is a solid performer, an improved Windows citizen, and a worthy mate for the rest of the Lotus SmartSuite applications. In addi-

tion to a wholly revamped user interface, the newest 1-2-3 for Windows (beginning with Release 4.0) offers two major innovations—a well-designed and group-aware scenario manager, and a vastly simplified mechanism for querying internal and external databases.

On several usability fronts, 1-2-3 for Windows is still inferior to both Quattro



All editing in 1-2-3 for Windows occurs in context. When you select a chart, the menu system changes to present chart commands.

Pro and Microsoft Excel. On the other hand, 1-2-3 for Windows is the only Windows spreadsheet to offer full compatibility with macro-driven applications created in 1-2-3 for DOS, Releases 2.x and 3.x. (Borland was forced by court order to drop its 1-2-3 keystroke reader, and Excel's 1-2-3 macro interpreter does not support Release 3.x commands.) Because this program retains the older menu tree as an alternative to the Windows pull-downs (press slash and the familiar ring-style menus pop up in a compatibility box), most legacy macros work without modification. Users can also easily extend such macros to take advantage of new features, create custom Windows-style dialogs and menus, and forge DDE links with other applications. But Lotus provides no written macro or function documentation.

Central to the new 1-2-3 for Windows user interface is the principle of in-place editing. A formula bar remains at the top of the worksheet, but all editing of formulas and labels occurs within the cells. Because long labels overwrite adjacent cells during the editing process, some users may wish that this feature were optional (as it is in Microsoft Excel, Version 5.0). In-cell editing, nevertheless, appears to be an ease-of-use advance, particularly for newer spreadsheet users.

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Graphs and databases are also manipulated in place. There is neither a separate program for connecting to external data sources (as there is in Quattro Pro and Excel) nor a distinct graph-edit mode. All graphs "live" on the worksheet, and when you select a chart or other graphic object, the package changes its menu bar and icon palette to offer the appropriate editing commands.

A single set of query commands allows access to on-sheet and external databases. (For external sources, the appropriate DataLens driver must be installed. Lotus ships drivers for dBASE, Informix, ODBC, OS/2 Data Manager, Paradox, and SQL Server; others may be obtained from third parties.) These commands no longer require the creation of on-sheet criteria ranges. A dialog box lets you choose field names and relational operators from drop-down lists and diagrams your query as you build it. You can rearrange the Boolean logic with simple mousestrokes and name the query for easy reuse.

The new Version Manager lets users create named sets of alternative values, with or without formulas and formatting instructions, for worksheet ranges. These "versions" are flagged by date, time, and creator, and can be accompanied by comments of any length. A simple stay-on-top window controls the Version Manager, letting you create new versions, move existing versions in and out of ranges, display a version index, and generate a summary report. Combinations of versions may be assembled into named scenarios. Like individual versions, scenarios can be moved in and out of your worksheet with simple mouse clicks and tabulated for off-line study. Version Manager offers extra benefits for 1-2-3 for Windows users who are also Lotus Notes users: concurrent file access, automatic notification of changes to a worksheet, flags that direct attention to unread versions, and the ability to grant different access rights to different users.

Workgroup users without Notes can still utilize 1-2-3 for Windows' new mail features. The Send Mail command supports Notes, MAPI, and VIM mail systems.

The new 1-2-3 for Windows, like Excel 5.0, has adopted the tabbed-page notebook metaphor introduced by Quattro Pro. But the page tabs in 1-2-3 for Windows serve only as navigation icons

and name-holders. You can't rearrange pages by moving tabs or select a range of pages by clicking on tabs. And 1-2-3 for Windows' group mode is still primitive when compared to the competition: It doesn't accept multipage data entry or let you work with a subset of your pages.

Windowing features in this package are limited. You can split your window horizontally or vertically and put your document in a three-page, fixed-perspective view. But independently manipulable multiple windows are still beyond this release. Other usability shortfalls: Users cannot hide rows, and the menu system cannot be accessed during formula entry.

This package's Windows citizenship is marred by the fact that a named range used as source data for a DDE link is identified only by its cell coordinates. This shortcoming makes a link meaningless if the source worksheet is rearranged—an all-too-likely occurrence. In addition, client links that have become invalid because the source file has moved are marked only by ERR; the program should present a File Open dialog box and let you repair the link.

The new 1-2-3 for Windows is a far better spreadsheet than its predecessor. It's good enough to merit first consideration for those who have compelling reasons to stick with Lotus applications. Its performance is superior to that of Quattro Pro for Windows. Its complement of analytic features is somewhat weaker than that of its competitors, however, and in terms of usability, it lags considerably.

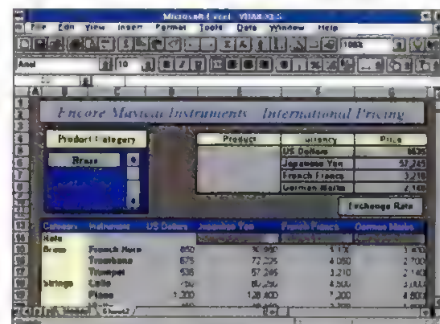
Microsoft Corp.

Microsoft Office Professional: Microsoft Excel (Beta Version)

Microsoft Excel, Version 5.0—still in utero as this review went to press—will offer notebook-style three-dimensionality, support for OLE 2.0, a new programming language based on Visual Basic, a simpler approach to building and modifying charts, new features for analyzing chart data, a Wizard for generating Improv-like crosstab reports, a new tool for querying external data sources (replacing the Q+E add-in that was bundled with Excel 4.0), a wealth of ingenious features for managing on-sheet databases, and assorted other

improvements. Because of its prerelease status, we were not able to evaluate Excel 5.0's performance, but in terms of features and usability, this is clearly the most richly endowed product in its field.

The most impressive innovations are in the area of data management. Excel 5.0 will replace the ancient criteria-range approach



When the light bulb on Excel 5.0's toolbar is lit, the Tip Wizard has a suggestion for you, which you can opt to follow or disregard.

to on-sheet queries and extracts with a pair of filtering commands. To find records by using exact-match criteria, you'll select field values from drop-down lists. For more complex queries, you'll specify criteria in a straightforward dialog box. Either way, the program will display qualifying records in place and hide the nonqualifiers.

Excel 5.0 will automatically calculate subtotals in lists, using any aggregate formula you choose. The subtotaled list can automatically be outlined so that you can move between summary and detail easily, and the AutoSum button will detect the presence of subtotals and generate the appropriate grand totals.

The package will also automatically distinguish field headings from sort operations. And the sort command will recognize user-defined nonalphanumeric sorting sequences. Excel will supply a few of these and you'll be able to add others.

Rather like the Workgroup Edition of Quattro Pro for Windows, Version 5.0, with its Database Desktop, Excel 5.0 will provide a separate application for querying external data sources. A subset of Microsoft Access (as Borland's tool is a subset of Paradox), this program—Query—will be linked to Excel and will allow you to create named, reusable queries. The program will support any data format for which you have a fully compliant

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ODBC driver. In the initial release of Excel 5.0, Microsoft will ship drivers for Access, Btrieve, dBASE, FoxPro, Paradox, Oracle, SQL Server, Sybase, Text, and .XLS files. The .XLS drivers will let you use Query to get at particular records in server-based spreadsheet documents.

Excel 5.0's new PivotTable Wizard, like Quattro Pro for Windows' Data Modeling Desktop, will let you transmute flat-file lists (whether on the worksheet or in external data files) into malleable crosstab reports. You can drag field headings between row, column, and page axes to change the angle at which you view your data. Like Lotus Improv tables (and unlike the tables produced by Quattro Pro for Windows' Data Modeling Desktop), Excel pivot tables can be three-dimensional. You can put selected fields on a page axis and use the mouse to move between data slices. Unlike Improv, Excel will link its charting module to its table manager. A chart plotted from a pivot table rearranges itself appropriately when you change the table's layout.

Excel 5.0's charting module will offer donut charts, error bars, and trendlines, in addition to some welcome simplifications. The distinction between "attached" and "unattached" text will virtually disappear (you'll be able to reposition any titles or text annotations with the mouse), and a new "drag and plot" feature will let you expand an existing chart by dropping new data onto it.

Like the new 1-2-3 for Windows, Excel 5.0 offers in-cell editing and in-place chart editing. When you double-click on an embedded chart, the program frames the chart in an OLE 2.0-style border and modifies the menu appropriately.

Excel 5.0 will be the first Microsoft application to offer Microsoft Visual Basic, Application Edition (VBA), as its macro language. For details, see the VBA sidebar in "Applications Integration: Getting It Together." The original Excel macro language (now called the "XLM language") will still be supported and expanded to include verbs for Excel 5.0's new features. Subsequent versions of Excel will continue to support the XLM language but will not expand on it. Excel's 1-2-3 macro interpreter (which supports Lotus macro verbs through Release 2.2 of 1-2-3 for DOS) will remain, notwithstanding the

recent court decision that compelled Borland to remove its 1-2-3 keystroke interpreter.

Like Quattro Pro for Windows and 1-2-3 for Windows, Excel 5.0 will let you assign names to pages, incorporate those names into formula references, and move between pages by clicking on the tabs at the bottom of your worksheet. The multiple file formats of earlier versions of Excel have been eliminated. Chart documents and .XLM macros imported from earlier versions appear as special page types within the Excel 5.0

notebook. New charts may be embedded or displayed full-screen on chart pages. Some Excel 4.0 users may lament the absence of the table-of-contents page in Excel 5.0 workbooks, but most users will find the integrated file format a large usability gain.

To acquaint you with all its features and shortcuts, Excel 5.0 includes a Tip Wizard, an unobtrusive help icon that will change color whenever you execute a task in any but the most efficient manner. You can ignore or banish the wizard, but you probably won't want to do either.

Databases

INTRODUCTION AND REVIEWS BY SHERYL CANTER

According to *PC Magazine's* online ZiffNet survey, fewer than 5 percent of purchasers select an office suite for its database component, yet nearly 25 percent report using the database regularly. The three databases we review here—Paradox 4.5 for Windows, Workgroup Edition; Lotus Approach for Windows, Release 2.1; and Microsoft Access, Version 1.1—collectively exemplify the recent trend blurring the old distinctions between professional and end user products. All offer powerful interactive tools that make them easy to use (you can create sophisticated applications without programming any of them), but they differ significantly in the power they pack under the hood.

At one extreme, Borland International's Paradox is a full-featured relational database product, providing virtually unlimited customizability and the capacity to handle really large data sets. At the other is Approach, the friendliest of the three, which offers the most canned functionality (merely opening a database automatically generates a default form to display the data, for example). It is, however, the least extensible and the slowest performer. Microsoft's offering, Access, falls somewhere between the professional and end user categories, providing Wizards and Cue Cards to make learning the product easy and offering the ability to handle

many database application requirements.

Format transparency is especially important for suite-based database products, since they must meet the needs of a broad user audience. Access, Approach, and Paradox, fortunately, can all read virtually any database format. All support the dBASE and FoxPro formats natively—indexes and all. In addition, Access supports Paradox 3.x, and both Access and Approach support Microsoft's ODBC (Open Database Connectivity) standard. Borland provides ODAPI (Open Database Application Programming Interface) support for connecting to SQL databases such as Microsoft SQL Server and Oracle Server.

Borland International Inc./WordPerfect Corp.

Borland Office for Windows: Paradox for Windows, Workgroup Edition

Paradox 4.5 for Windows, Workgroup Edition, is a wolf in sheep's clothing—an industrial-strength database product hidden beneath a well-designed, user-friendly interface. It takes a little longer to get comfortable with Paradox than Microsoft Access or Lotus Approach for Windows—but not that much longer. And the

Windows Application Suites

reward for the effort is a database product that you won't soon outgrow.

In Paradox, every database element is an object, including the items in a browse window, the interface objects on a form, and so on. Clicking on any object with the right mouse button brings up a context-sensitive menu for that object. This makes navigation exceptionally easy. You don't have to hunt through pull-down menus to find the options you need.

DATABASE ORGANIZATION

Paradox users must specify paths for two special areas: the Working Directory and the Private Directory. The Working Directory is where Paradox stores the forms, queries, reports, and other elements associated with a database. For multiuser setups, the Working Directory is likely to be on the server. The Private Directory, generally located on the user's local hard disk, is the default directory for query-result sets.

To help users manage the potential blizzard of files and directories, Paradox offers aliases to make addressing long path names easier and "folders"

for collecting database elements. The Paradox folder serves a function similar to that of the database window in Access, but it is somewhat less effective in organizing database components.

Folders show each element as an icon (with different element types using different symbols). All icons are displayed at once, however, so you have to hunt around to find what you want. Also, new items (forms, queries, and the like) are not added automatically to the folder; you must add them manually as you create them, and this is easy to forget. Further, double-clicking an icon (the natural instinct of a seasoned Windows user) opens the element in View Data mode rather than Design mode. Ordinarily, this doesn't cause problems; you just click on the Design icon after the View Data window opens. But if the element involves a long query, this is inconvenient. To open

an element in design mode, you must right-click or use the menus.

DESIGNING WITH OBJECTS

In Paradox, every user-interface element on a form is an object. Objects can be contained inside other objects and moved around the form as a unit. An Object Tree diagrams the relationships between the objects on a form.

Clicking the right mouse button on a UI object (or any other) brings up a context-sensitive menu. This makes configuring forms easy since you don't have to hunt through pull-down menus to find the settings you need. If necessary, you can attach ObjectPAL (Paradox Application Language) code to interface objects by selecting Methods from the object menu. Coding is necessary only for the most

sophisticated applications, however.

Paradox builds forms around "data models," which identify all the tables involved and their relationships. Indeed, the first step in creating a form is to select the tables needed and depict visually their relationships using Paradox's Data

Model dialog box (a much easier tool to use than the equivalent Relationship dialog box in Access). The model is set up visually; lines connecting related tables are drawn with the mouse. Because Paradox lets you describe even complex relationships as part of the form specification, you don't need to run a query before using the form.

Designing forms in Paradox is simple, and rich built-in tools are provided. The Speed Bar across the top of the screen contains some powerful interface objects. For example, a crosstab object lets you place one- and two-way tables directly on a form. (Access lets you create crosstabs but only as part of a query. Approach doesn't support crosstabs.)

It is easy to use a form to search for particular records as long as your search involves only one field. But if you want to find, say, all customers living in California

who have purchased more than \$2,000 in equipment, you'll need to use the QBE (query by example) window.

The QBE window is a bit mysterious at first. You will not figure out how to use it by diving right in, and even the on-line help won't tell you everything you need to know. It's not that it's hard; it's just not obvious, and you have to read the manual. But once you get the hang of it, you'll find it quick and easy to create even the most complicated queries.

Each table in the query is represented by a row of empty boxes with field names at the top. You select a field by placing a check mark in the field area. There are four different types of check marks. Depending on which one you use, the result set may or may not include only unique records and may or may not be sorted. Table joins are depicted via example values in the fields on which the tables are joined; selection criteria can also be typed into field areas.

ROOM TO GROW

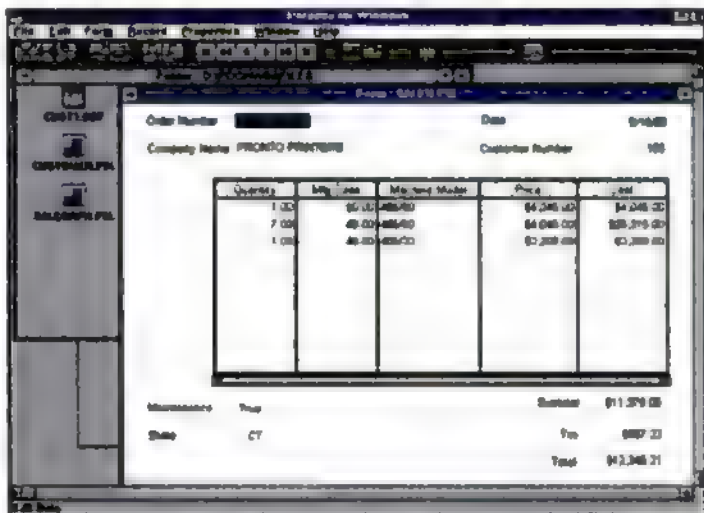
The organization of some of its screens may seem foreign at first, but it takes just a short time with the manuals to be productive in Paradox. The powerful PAL scripting language is there if you need it, but most database applications can be built without any programming. With Paradox, you get a system that's easy to use, and yet powerful enough to handle large databases and meet the customization needs of professional developers.

Lotus Development Corp.

Lotus SmartSuite for Windows: Lotus Approach for Windows

When Lotus acquired Approach Software in June 1993, it gained Approach for Windows, Release 2.0. Shortly after the acquisition, Lotus came out with Approach for Windows, Release 2.1. This program, adept at both building small applications and accessing corporate data, fits nicely into the Lotus SmartSuite bundle.

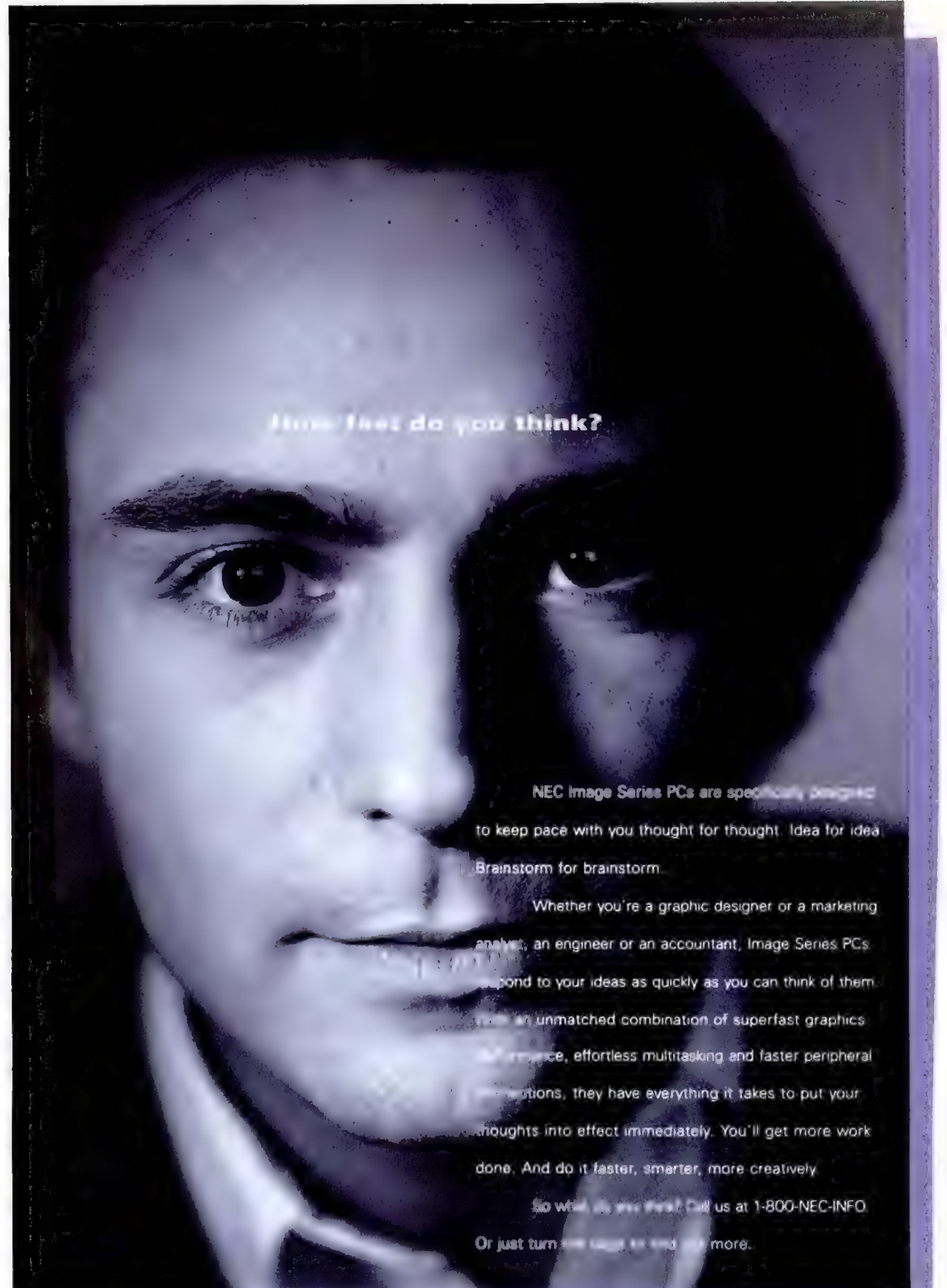
Release 2.1 is a minor upgrade to Release 2.0 (reviewed in our issue of January 26, 1993). In Release 2.1, Lotus added features to make Approach one of its own; the package now has SmartIcons, a



Paradox brings database elements together as icons in a folder. Double-clicking on a form icon lets you view your data.

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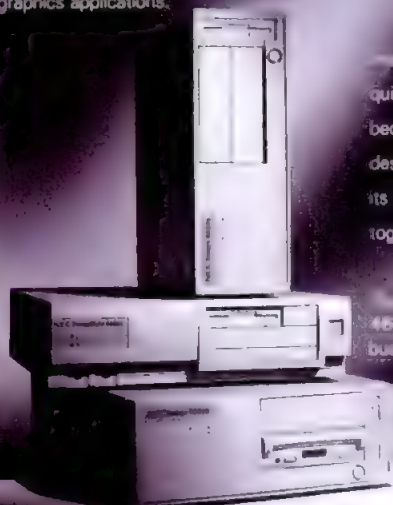
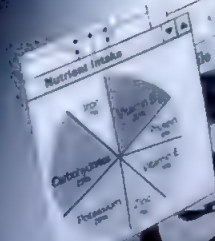


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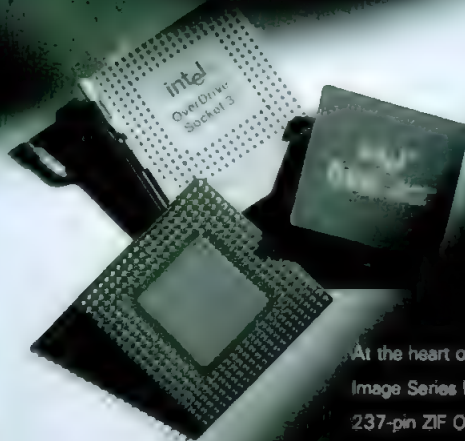
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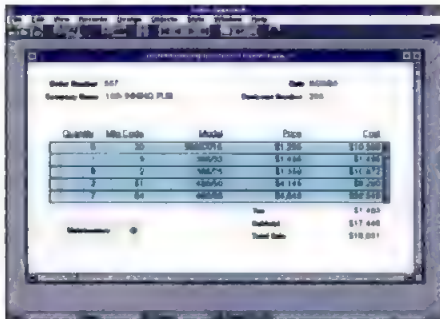
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status bar, and support for the .WK4 file format of 1-2-3 for Windows, Release 4.01.

Approach is a user-friendly nonprogrammable database with numerous prepackaged, task-specific features. Unlike Access and Paradox, it does not have



Approach stores all elements of a database in a View file, which can contain any number of forms or reports.

a scripting language, though macros let you automate some functions.

Whereas Paradox is a professional development tool and Access straddles the professional and end-user categories, Approach is decidedly an end-user product. Although it lacks some of the sophisticated interface objects offered by the other two packages, it easily created the forms required by our test script. On the other hand, users with large, complex databases may find the program's performance unacceptably slow.

VIEWING YOUR DATA

Although its default data format is dBASE IV's .DBF format, Approach can also read dBASE III+, Paradox, and FoxPro databases, and SQL tables. Release 2.1 added ODBC (Open Database Connectivity) support and includes drivers for Btrieve, Microsoft Access, and various SQL tables.

Approach manages databases and their associated elements through what it calls Views. Views contain forms and various types of reports and can reference one or many data tables. Approach graphically depicts the relationships among tables in a Join window, where you can specify rules for enforcing referential integrity.

A Field Definition dialog box lets you describe the data type and length of each field in a table. A mouse click on the Options button brings up expanded options for each field. This is where you indicate whether a field is indexed, provide default

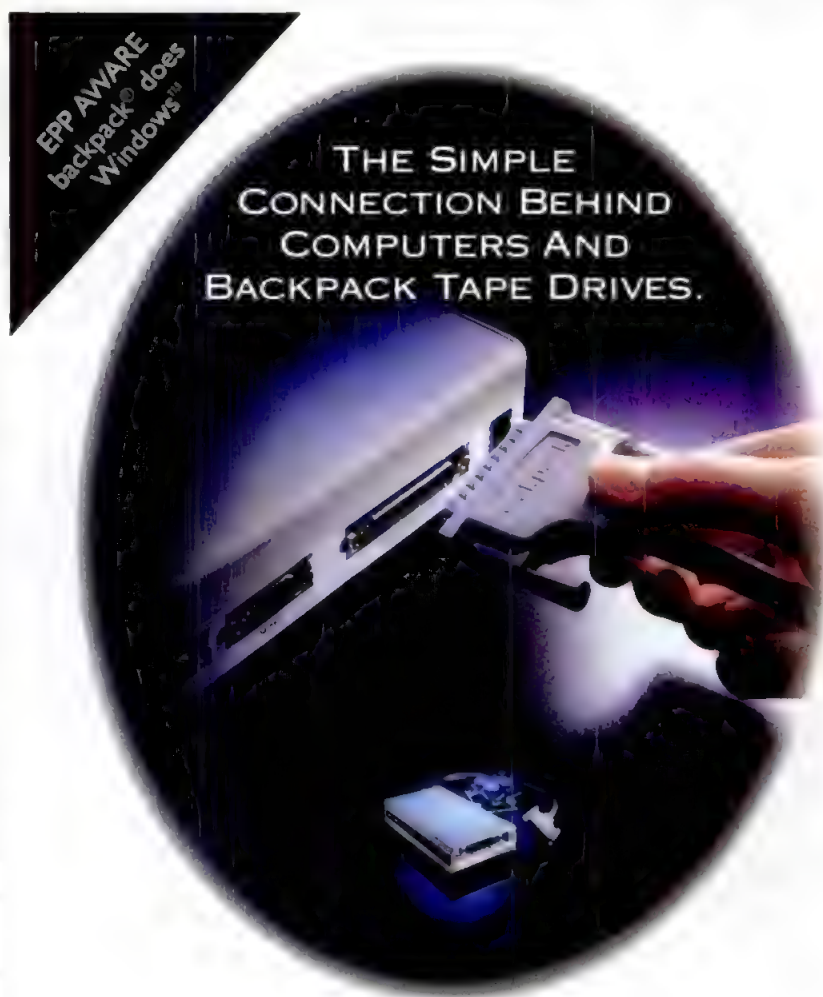
values, and give the starting value and increment amount for serial fields.

When you finish defining the fields in a table, Approach creates a form for the table using the default options. Default colors, fonts, placement of field labels, etc., can be changed through a dialog box in the Style menu. You can also modify the appearance of specific fields without changing the defaults. Like Paradox,

Approach uses an object-oriented design that lets you right-click to pop up object-specific menus. You can change the characteristics of several objects at once by selecting them all, clicking the right mouse button, and changing a setting.

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reports, form letters, and mailing labels within the same View. A Switch option under the View menu lets you jump quickly among the various View documents.

The Form Letter option makes mail-merges painless; you simply embed field names in the text. The Mailing Label option provides a list of predefined Avery label types that you can select by Avery code or label dimensions. If none of these suit you, an Other option lets you define labels to your own specifications. Access and Paradox also let you create form letters and mailing labels, but not as easily as with Approach.

Searching for data within a form is also especially easy with Approach. When you click the Find icon, the data-entry form becomes a QBF (query by form) window. To perform searches based on one or more fields, you simply type values or expressions into the relevant fields and then click on the Perform Find icon, whereupon you can move sequentially through the result set.

Approach's search capabilities are exceptionally powerful and easy to use. The Find toolbar, a handy set of icons across the top of the screen, simplifies the building of search expressions by automatically inserting symbols for "equal to," "not equal to," and the like.

Approach uses macros rather than a scripting language to automate tasks and build applications. Approach's macros let you do things such as switch to a different View document, perform a search or sort, or set a field to a specified value. You can also assign macros to buttons and chain macros together to build small applications, but Approach doesn't allow complex logic.

What Approach does well it does very well, but it lacks features for analyzing your data in depth. For example, there is no built-in charting capability, which means that users have to rely on OLE to take advantage of another product's charting capability. There is also no built-in facility for computing commonplace statistics such as cross-tabulations.

LIMITED CAPACITY

Approach's database engine is not designed to handle large tables efficiently. Building the multitable form specified in our test script was easy, but moving

sequentially through the records was very slow; it took several seconds to move from record to record. Searches using this form were also extremely slow.

Although it's unlikely that Approach will ever become your company's standard database development tool, it's right on the money if you need to access corporate data with minimal effort or quickly put together a simple database application.

Microsoft Corp.

Microsoft Office Professional: Microsoft Access

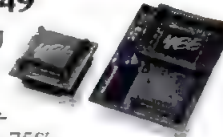
Microsoft Access, Version 1.1, is built around a database window that contains icons along the left for database elements:



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table, query, form, report, macro, and module. When you click on an icon, Access displays a list of those types of items in the main window. Three push buttons across the top of the window let you create new items or open or edit existing ones. This organization makes it easy to keep track of all the elements in your database.

Another feature that makes Access easy to use is Cue Cards. These walk you through the creation of tables, queries, and other data elements. In addition, Access provides Wizards that guide you through context-sensitive on-line help, well-organized, clearly written manuals, and the creation of forms.

While it is genuinely easy to use, Access is not a toy. Unlike Paradox for Windows, it does not offer the customizability needed for professional database applications. But Access's functionality far surpasses that of nonprogrammable products such as Lotus Approach for Windows:

PAINLESS DESIGN

When you create a new form, Access presents you with two ways to proceed: FormWizards and Blank Form. If you select FormWizards, Access will ask you to select among four default formats: single-column, tabular, graph, or main/sub-form. Pictures that roughly correspond to these options appear on the left side of the dialog box. Making a selection launches a Wizard, which prompts you for necessary information through a series of dialog boxes. When you've answered all the questions, the form is created for you. If the finished result is not exactly what you want, it's easy to modify.

Access's form design facility is similar to that of Microsoft Visual Basic. A floating toolbox provides a set of interface elements, and a Properties window controls the settings for each element. A broad selection of chart types is available through little more than a few mouse clicks.

As with Visual Basic, you can attach code to user-interface objects to control

their behavior. To do this, you first create a macro in the database window and then associate it with an event in the object's Property sheet. Access ships with more than 50 built-in macros, with functions

such as MsgBox, Print, and OpenForm. If the built-in macros don't do exactly what you want them to, you can choose the RunCode macro to execute your own Access Basic code.

ReportWizards simplify the creation of reports by walking you through the settings, and the same toolbox used for screen design is available in report design mode.

ALL IN ONE

Access stores all its tables, its data dictionary, and all related queries, forms, and reports in one big database file. There are several advantages to this approach. For one thing, the existence of one large file means you can't accidentally delete or modify crucial files in an Access database; the monolithic structure helps to ensure relational integrity. In addition, this approach gives you the luxury of using long names that don't conform to the DOS naming conventions when saving tables, forms, queries, and other elements.

Relationships among tables are specified via the Relationships option in the File menu and stored in the database's dictionary. An option tells Access to enforce automatically relational integrity so users cannot create "orphan" records. Unfortunately, this dialog box is one of the few poorly designed elements in Access. It is not intuitive to use, and there's no way to view relationships that have already been set up.

THE ACCESS ENGINE

The data source for a form—which can be either a table or what Access terms a *dynaset*—is specified in the form's Properties list. Dynasets are query-result sets with a useful twist: When you make a change to a dynaset, the underlying table is updated. This produces striking performance advantages when the dynaset is significantly smaller than the full database.

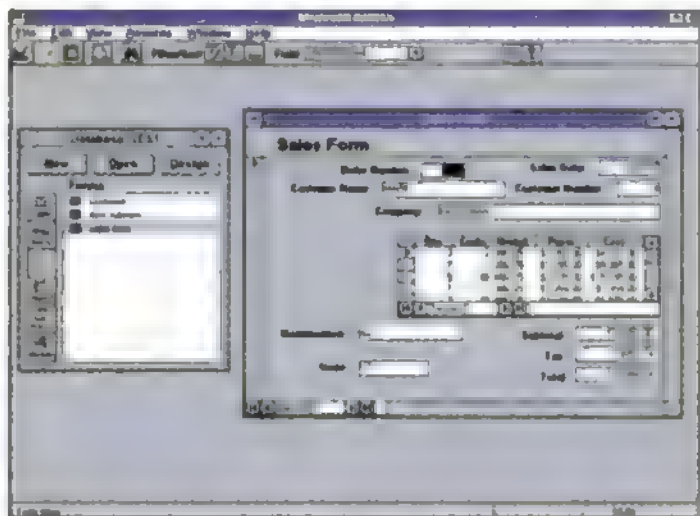
You create dynasets in a two-part window. The upper pane shows the tables involved in the query and the relationships among them; the bottom pane is a QBE (query by example) display where you list fields to include in your query along with any selection criteria.

Dynasets usually work quite well, but not always. One of the forms we created as part of our test application contained fields from four separate tables in a parent/child configuration. The main form and the subform both contained data from two different tables. Because each portion of the form contained data from multiple sources, the only way to create it was through a dynaset, which meant that we had to run a lengthy query every time the form was used.

Access also has trouble with large files. We could not restructure a 1MB table with 30,000 records because of insufficient memory, though our test computer had 16MB of RAM. We also ran into capacity problems because of the extremely large temporary files that Access creates. When our TEMP environment variable pointed to a 2MB RAM disk, we sometimes ran out

of space during queries. Switching TEMP to point to the hard disk caused a significant performance hit.

If you need to build moderately complex database applications, Access is an excellent choice, because it's easy to learn and easy to use. Though professional developers are likely to run out of power and be frustrated by its limitations, Access is an excellent compromise between power and ease of use for end users.



Access's Database window provides centralized access to all database elements. To view a form, just select it and click the Open button.

Microsoft Access stores its tables and data dictionary, as well as all related queries, forms, and reports, in one big database file.

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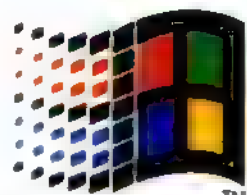


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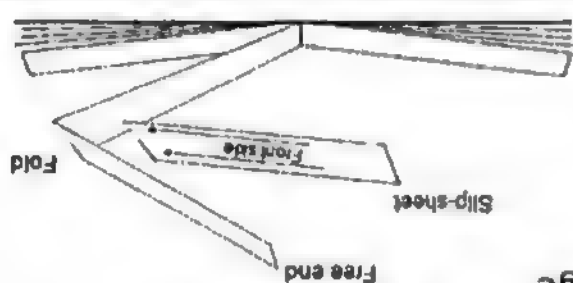
Back

ObslipBack-0018



Inverted Back

1. Follow instructions on the other side

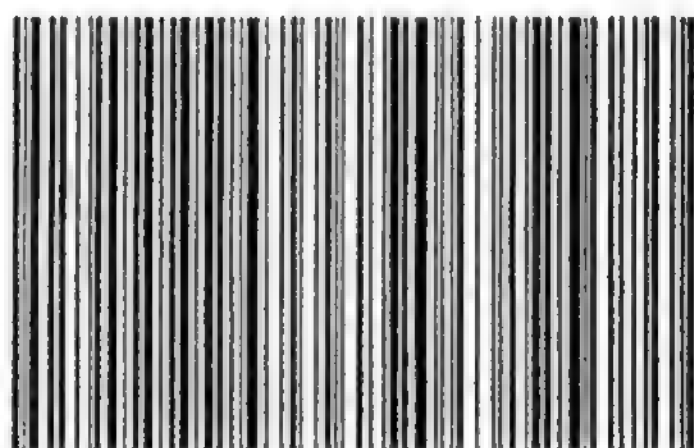


1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

Foldout slip-sheet



GbsSlipSheet-001



Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
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3. Slice the folded edge
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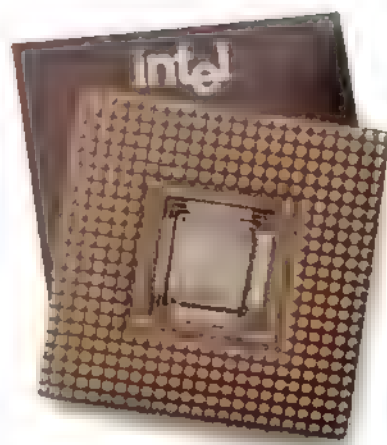
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So we wouldn't

when and where it's needed most. So XL uses less power and runs quieter with any chip.

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*November 15, 1993

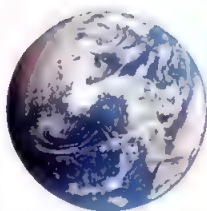


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Presentation Graphics

INTRODUCTION AND REVIEWS BY LORI GRUNIN

Lotus SmartSuite and Microsoft Office Professional include two of the best programs on the market for presentation construction: Freelance Graphics for Windows, Release 2.01, and Microsoft PowerPoint, Version 4.0. Borland Office lacks a dedicated presentation program; Quattro Pro for Windows, Version 5.0, Workgroup Edition, however, offers more advanced presentation capabilities than your average spreadsheet.

Freelance and PowerPoint provide excellent support for standard, predominantly text-based presentations. The soon-to-ship Version 4.0 of PowerPoint now offers tools to help you *formulate* your presentation, not just *format* it. And both Freelance and PowerPoint have beefed-up workgroup functionality: They support cross-presentation search, retrieval, and version-tracking capabilities. Also, e-mail enabling in both programs lets you route a presentation around the network for comment. But neither package lets you conduct presentations over a LAN or WAN, as Software Publishing Corp.'s Harvard Graphics does now.

Quattro Pro provides some advantages in terms of data manipulation and graphing. This package gives you an utterly flexible relationship between data ranges and chart elements, and it lets you query external databases directly—something that no presentation product can do. Its Experts—specifically the Graph Expert—also prove a strong rival for the Microsoft Wizard that creates data charts. Further, Quattro Pro's new Presentation Advisors help users choose the proper template for a presentation based on, for example, the level of formality, sophistication, and vividness that the user would like to achieve. As a whole, though, the package lacks the level of presentation management tools and text-handling flexibility needed to make it a true substitute for a dedicated presentation package. WordPerfect's WordPerfect Presenta-

tions might be an alternative—more in line with the Microsoft and Lotus offerings—for users of the Borland Office suite.

Borland International Inc./WordPerfect Corp.

Borland Office for Windows: Quattro Pro for Windows, Workgroup Edition

Just because Borland Office lacks a dedicated presentation program doesn't necessarily mean that you need to attend your meetings with no visual aids. The presentation tools in Quattro Pro for Windows, Version 5.0, Workgroup Edition, don't come close to matching the ease and sophistication of those in Microsoft PowerPoint, Version 4.0, or Freelance Graphics for Windows, Release 2.01. But for creating and managing presentations, those tools do allow you to generate polished slide shows in return for a little more effort.

When building a presentation in Quattro Pro, you actually create a series of individual graph windows that live on the last page of your notebook—the *graph page*. The presentation proper is actually a group of charts—data, text, graphics, or some combination of the three—selected and dragged onto a named slide-show icon. One advantage of this approach is that it lets you easily create a number of custom slide shows based on a single pool of charts.

A promising new set of tools offered by Quattro Pro is the Presentation Advisors—macros that suggest spreadsheet formats, slide backgrounds, fonts,

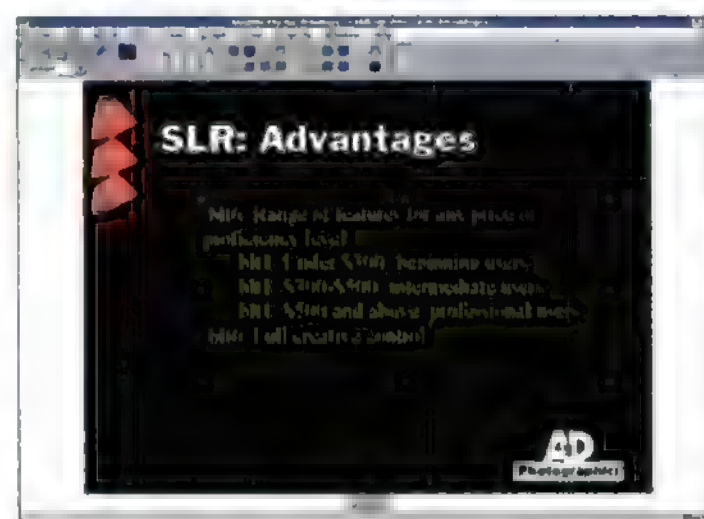
and data-chart types based on, for example, the desired level of formality, sophistication and vividness. The Graph Advisor, for instance, helps you select an appropriate graph type based on whether you'd like to show differences or trends, and how plain or fancy the graph should be.

FLEXIBLE CHARTING

As you might expect, Quattro Pro's strength lies in its data manipulation and charting. To create a data chart, you simply select the range you wish to graph, click the Graph New button, and then verify that the ranges, labels, titles, and other elements correspond to the series and information you want in your chart. If you're confused, Quattro Pro's clever Graph Expert will walk you through the graph-creation process with your own data. This package features the standard array of bar, line, and pie charts; it also includes some exotics—such as "doughnut" charts—in both 2-D and 3-D variants.

Unlike most presentation programs, Quattro Pro gives you great flexibility in terms of the relationship between worksheets and charts; since you can select discontinuous ranges, you don't need to tailor the layout of the worksheet to that of your graph. You can also override graph type for a particular series, so that, say, series A, B, and D are represented by bars but series C shows as a line.

Text charting is more primitive. You build text charts in a blank window using the



While Quattro Pro does allow you to create text charts, its handling of text is rather primitive.

program's annotation and drawing tools. The Slide Template Advisor helps you choose a background design; when it generates the chart, it adds "click here"—type text boxes. You can then use the Slide/Graph Font Advisor to similarly choose fonts.

Both the text and graphics tools are surprisingly weak. For instance, you can only select from eight fixed bullet symbols, which you insert via a code, such as \blt8\.

Furthermore, since boxed text can be only a single font size, you can't create multilevel

lists with decreasing point sizes unless you make each level a separate text box. As for graphics, Quattro Pro gives you a basic set of geometric primitives, a freehand drawing tool, an arrow tool, and a "freehand polyline" for curves. You can group and stack objects, but you can't rotate them.

By contrast, the program has surprisingly robust screen-show capabilities. It gives you a light-table view for sorting your slides—although you can't group-select them—and a creditable variety of transition effects. You can also manually create slide builds with the package's overlay option. Quattro Pro's printed output is very good overall, though speakers' notes and handouts aren't supported.

UNNECESSARY WEAKNESS

You format all elements in Quattro Pro via a combination of icons (*Speed Buttons* in Quattro Pro parlance), context-sensitive right-mouse-button menus, and the Object Inspector—an all-in-one-dialog box for adjusting various attributes of entire objects. Unfortunately, Quattro Pro's chart-formatting tools, for graphs as well as for text and graphics, don't always satisfy.

On a global level, the program lacks tools for easily maintaining a consistent appearance across charts. The most powerful feature for maintaining this consistency is the Graph Copy command, which duplicates an existing chart; you can opt to copy any combination of the style, data, or annotations into a new or existing named chart. While this works fairly well for creating a series of identical data-chart types and repeated background elements, it's an awkward means of dealing with text since a text block's format isn't picked up with the text. To create a consistently formatted series of text charts, you have to copy the first graph using Graph Copy and then replace the old text with the new. This is especially bewildering because the notebook pages support named styles. There's no preview for any formatting operations.

Similarly, the Presentation Advisors are disappointingly implemented. For instance, the backgrounds are nothing more than CGM files that the program pastes onto the slide; you still have to use Graph Copy—or use the Advisor over and over—to get consistency.

Even graph formatting isn't perfect

with this program. Axis-label formatting is only moderately flexible: It can stagger labels into one, two, or three levels, and it can truncate labels to a user-defined length. This doesn't work very well with long labels, though, and labels can't be rotated to fit.

Quattro Pro may not make anyone's top-ten list of presentation products. But for primarily graph-based slide shows, the tools it offers may be more than sufficient for your needs.

Lotus Development Corp.

Lotus SmartSuite for Windows: Freelance Graphics for Windows

Lotus has made a name for Freelance Graphics for Windows, Version 2.01, by concentrating on the click 'n' go factor—that is, the time it takes for a new or infrequent user to get up and presenting. As long as you don't either wish to customize extensively your design or have specialized charting or graphics needs, you'll find that the product's reputation for facilitating the quick creation of attractive presentations is well earned.

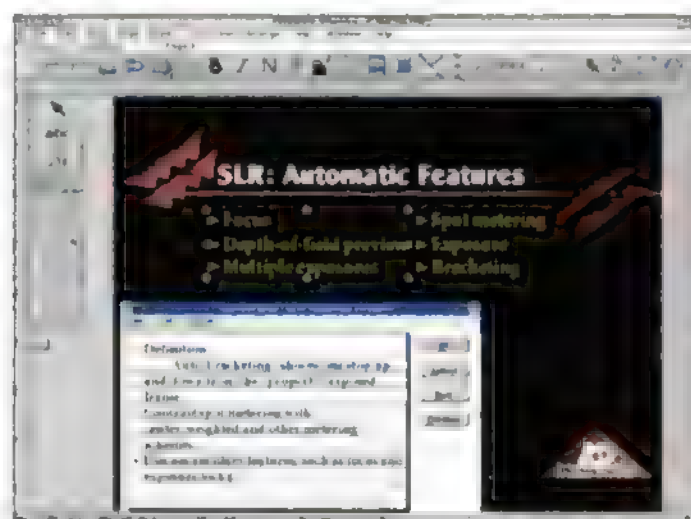
When you first load it, Freelance presents you with the choice of either running its clever QuickStart tutorial, picking a SmartMaster set for the entire presentation and page layout for the first slide, or working on an existing presentation. Jumping right into a new presentation is fairly painless, thanks to the company's pioneering (and much-imitated) "click here" box design. For instance, selecting objects labeled "click here to add symbol" or "click here to add bulleted text" takes you immediately to the appropriate next step, in these cases the Add Symbol dialog or text-editing mode.

SmartMaster sets have three layers: a page background, a basic layout (which controls all elements that repeat across the entire presentation), and specific page layouts (such as a two-column bullet

chart). Adding customized "click here" boxes is easy: Just create a text block or object, indicate that being a "click here" block is one of its attributes, and specify the prompt text. If Freelance encounters a keyword, such as *text* or *chart* in the prompt, it will automatically trigger the appropriate dialog when clicked. You can, alternatively, specify the trigger.

In addition to organizing the text, you can apply page layouts within the outliner. Though there's a good set of outlining tools—Freelance offers the abilities to expand and collapse the view, group promote and demote, and create two-column bullet charts—you can't directly import Ami Pro outlines except by means of a special macro provided in the Working Together Bonus Pack recently added to Ami Pro for Windows 2.01 (the version included in Lotus SmartSuite 2.1).

Freelance takes a similar step-by-step approach to generating both the standard selection of tables and organization of two- and three-dimensional business charts. It also provides less common chart types like radar and high-low-close-open.



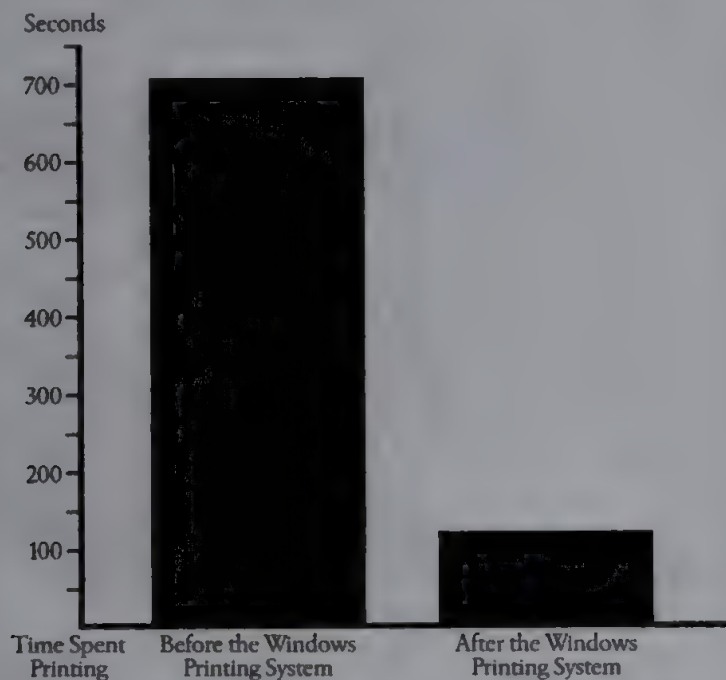
Rather than entering text on separate notes pages, Freelance uses an index-card metaphor, so you can insert or recall notes on the fly.

In the data sheet, ranges for series, categories, labels, and other relevant cells are clearly marked for easy data entry. When you import data, the program loads the source worksheet into a window, and you select the ranges to associate with different chart areas.

On the downside, this approach robs you of some flexibility. For instance, you can't select discontinuous ranges of data when importing or graphing in order to choose, say, first- and third-quarter earnings. Nor does the program's data sheet support any basic math functions. You can, however, hide a series.

While the program's illustration tools might get lost in the crowd of presentation programs currently on the market, the package itself is the only one of the three reviewed presentation graphics packages that supports Bezier-curve editing and

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wraps text to a variety of preset or user-defined paths. You can also use the canned symbols from the product's rather stolid symbol library or add your own to custom libraries.

Freelance takes full advantage of user interface niceties. It uses the same SmartIcons as found in the rest of the suite, and a click of the right mouse button pulls up a context-sensitive menu. Many of Freelance's attribute boxes allow you to change multiple attributes for multiple elements. You can, for instance, format all the levels of a bullet chart, the bars in a data chart, or the timing and transitions in a screen show. Almost every attribute dialog box gives you a preview option as well.

If you need a lot of formatting flexibility, however, you might become frustrated with Freelance's "preset" mentality. Formatting options are consistently limited. For example, you can only use symbols (rather than dingbat fonts) for bullets. Still, you can quickly generate numbered or alphabetized lists by, say, selecting "1" or "A" as your bullet.

Freelance lets you work with no more than 256 colors, and these are always dithered—even in display modes greater than 8 bits. Confining you to the indexed palette, though, does enable Freelance to offer DOS runtime screen shows, unique among the products reviewed here. Although the program doesn't handle the dithering of images with color depths greater than 8 bits, the display of 8-bit presentations works sufficiently well under both DOS and Windows.

Freelance produces good hard-copy output as well, although printing and layout options for speakers' notes and handouts are extremely limited. To create pages with multiple slides per page, you need to use the Presentation Handouts Preparer macro in Ami Pro for Windows, which simply copies black and white thumbnails of the slides into an Ami Pro document, allowing you full control over page format.

To manage your presentations, Freelance takes advantage of Lotus Notes for maintaining document-information databases that comprise subject and category fields, as well as eight user-definable fields.

The current version of Freelance faces tough competition from products such as

Harvard Graphics for Windows and Version 4.0 of Microsoft PowerPoint. But for quickly generating uncomplicated presentations, it's still a great program and a great suite addition.

Microsoft Corp.

Microsoft Office Professional: Microsoft PowerPoint (Beta Version)

If you're struck by a feeling of déjà vu the first time you see Microsoft PowerPoint, Version 4.0, then Microsoft has done what it set out to do—create a presentation program that operates as much like Microsoft Word for Windows and Microsoft Excel as is possible. But a deeper sense of déjà vu stems from Microsoft's attempts to redefine the way users create presentations, evident in the first version of PowerPoint. Not only does PowerPoint use Wizards to both guide you through the mechanics of generating a presentation and automate mundane tasks, but it also attempts to help you decide what the presentation should say. While the implementation needs a bit more work, even the beta version of PowerPoint 4.0 we looked at should make presenters—and the competition—take note.

The first difference PowerPoint veterans will notice in the new version is how the program starts up: with a "Tip of the Day" (you can turn this off if you want to). Once you've sent the Tip Wizard away, another box pops up to guide your entry into the program. Three of the five offered selections are standard choices (such as picking a slide template). The other two are wizards.

The AutoContent Wizard is the primary ground-breaking feature offered by the product, a sort of "click here" approach to content. It prompts you for the topic of your presentation and other information you'd like on the title slide and then asks

what type of presentation it is, such as Communicating Bad News. The program then generates a canned presentation that gives you a proposed structure and design and launches you into the outliner. For instance, on slide two of the Communicating Bad News presentation, it recommends that you explain "where we are today" and tackle points that "discuss subject background" and "include history, facts, or strategies to be considered."

Alternatively, you can choose the Pick a Look Wizard—useful but less successfully implemented than the AutoContent Wizard. For one thing, it simply puts a different face on choosing a slide master design by limiting your selection according to output device. Also, it leads you into selecting the types of output you'll be generating (such as handouts and speakers' notes) and the repeating text you'd like on those pages, rather than letting you select a color palette or some other design-related task.

Microsoft also follows the presentation pack in some respects. The company has finally adopted page layouts, so you can now easily format different chart types.



In Version 4.0, Microsoft has overhauled PowerPoint's interface so that it behaves more like Word and Excel.

Power users may dislike the way the AutoLayouts feature works, however: You control the placement and size of the object area, but these choices apply to all layouts—text and data charts alike. Similarly, you can't edit nontext chart-layout attributes, such as the fonts used in a graph. On

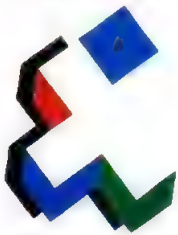
the other hand, AutoLayouts do present an easy way to reconfigure quickly all layouts simultaneously, and you can save customized data-chart types and attributes.

PowerPoint also now uses "click here" boxes for text-entry areas (you double-click on object areas). Because you can't edit AutoLayouts, you can't customize the prompt text as you can in Freelance Graphics for Windows.

Evolutionary changes aside, you won't find many additional features since the last version. Most of the changes have taken place either in the OLE modules

Punch

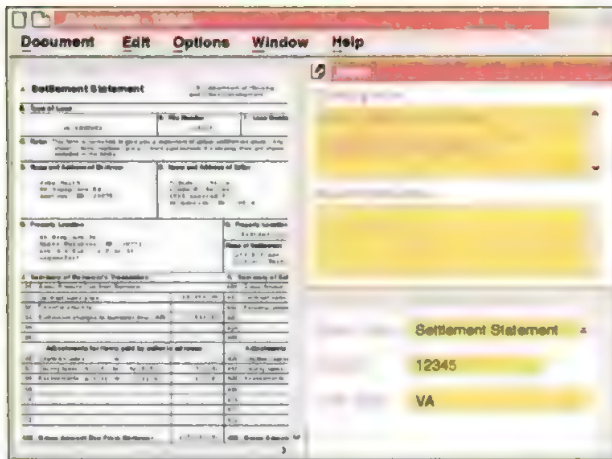
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COVER STORY

Windows Application Suites

that serve PowerPoint (such as Microsoft Graph and the ClipArt Gallery) or as a result of the addition of links to other programs—such as Report-It, which dumps a presentation's outline into Word.

Much of the program (including Graph and the cross-document search engine) was still under construction during testing, but what we saw of the Graph server looked much improved over the one in the previous version. The program now ships with a version of OrgChart that works via a clunky OLE 1.0 link.

Despite changes, PowerPoint preserves many of the weaknesses of the previous version. Design-oriented users will find its illustration tools extremely limited; the only significant new capability is free rotation. The outliner still doesn't support the second column of a two-column bullet chart (something to keep in mind when using Report-It).

Hard-copy output and electronic presentation capabilities are about the same as before. You get good printouts, but to get a monochrome preview, you need to go through the color-scheme-picking

process: Choose a white background and a black foreground and then choose either the gray scale or black-and-white-color-scheme thumbnail. Although PowerPoint doesn't support sophisticated branching during screen shows, it now has the ability to hide slides (so that they don't play during the show but remain available for backup), launch applications, and load files (as yet unimplemented when we saw the product).

PowerPoint, Version 3.0, was respectably strong in generating predominantly text-based presentations, though, so Version 4.0 doesn't suffer much from the lack of changes in its fundamental features. It does do some nifty new things with text handling, though, such as allowing you to make sure that your presentation consistently uses or doesn't use periods.

Since we tested prereleased software, we can't draw any conclusions about the stability of the final product. What we did see, however, is enough to indicate that Version 4.0 will probably be an admirable product for generating and managing standard presentations and an asset to its suite.

The Extras

ADDITIONAL PRODUCTS FROM LOTUS AND MICROSOFT

Lotus Development Corp.

Lotus SmartSuite for Windows: Lotus Organizer

BY ROBIN RASKIN

Lotus Organizer, Release 1.17, uses a handsome tabbed-notebook metaphor to combine calendar tracking, to-do items, contact lists, simple project planning, and free-form notes. Though this program doesn't have the versatility of Ecco or PackRat, either in customizability or the links it forges between data, Organizer is elegantly designed, easy to use, and reasonably well endowed. It also serves as a group scheduler—letting you send and receive calendar events—if you have Lotus's cc:Mail or Notes.

The package's interface has many ease-of-use touches: To specify the dura-

tion of an appointment, you pull a time slider. You can prioritize to-do lists, rolling over any undone tasks. The project planner provides a color-coded Gantt-chart view of activities. You can organize the notepad into mininotebooks by topic. Other niceties include autodialing, rudimentary job-cost tracking, hooks to e-mail, plenty of import and export capability, and abundant print options.

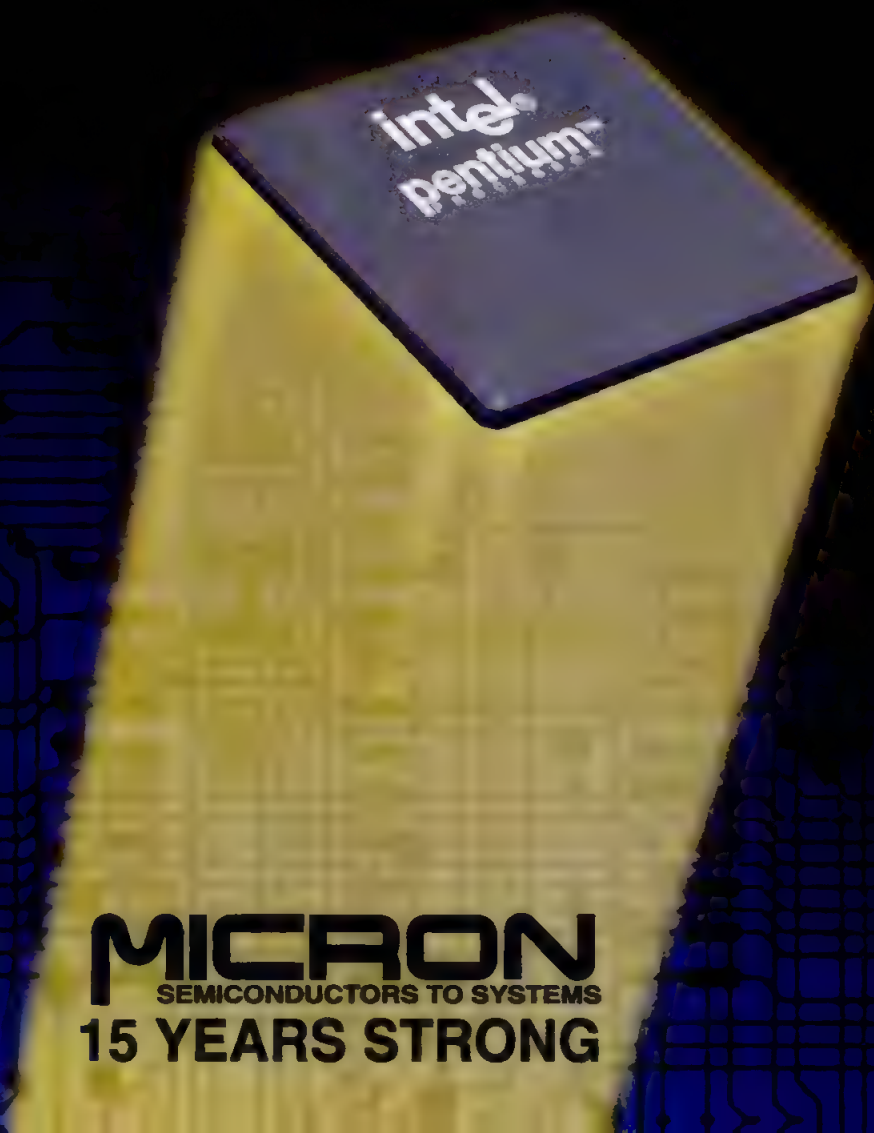
Microsoft Corp.

Microsoft Office Professional: Microsoft Mail

BY TED STEVENSON

One component of Microsoft Office Professional that you may or may not be able to use is the client package and license for Microsoft Mail, Version 3.2. If Mail is

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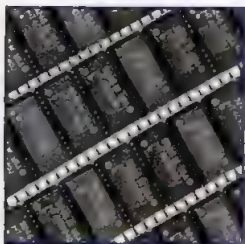


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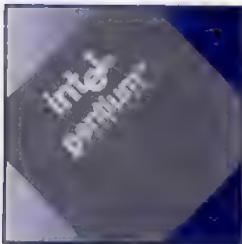
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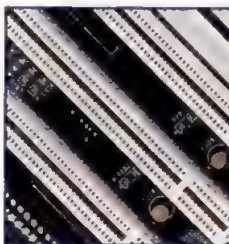
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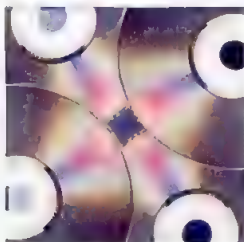
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pentium

your organization's e-mail package, you're in luck—not only you will be able to send and receive mail, but you will also have one of the best e-mail products around.

Mail has an attractive, uncluttered interface with large icon buttons for eight of the most commonly used functions (Compose, Reply sender, and Reply all, among others). Additional buttons (such as Address and Attach) appear in appropriate dialog-box contexts. The extensive

use of drag and drop, together with this straightforward interface, makes the program highly intuitive and easy to use. If that's not enough, Mail's Help facility has built-in demos to teach the basics.

Mail is quite fast when compared with some other popular Windows mail packages. It lacks the rules feature that some of the competition now provides, but it offers effortless and flexible creation of nestable storage folders.

grating the different components. Some, like the Working Together Bonus Pack macros in Lotus SmartSuite, aim at automating the movement of information between individual programs. Others, like Microsoft Office Professional's Cue Cards, help users work with multiple apps.

Last but not least, a suite comes with a single number for telephone support, which should reduce the frustrations and finger-pointing that we've all experienced and engaged in when two applications don't work together.

By making the components work better together, integration promises that application suites will be more than just a good deal; they should help make us all more productive. Here's what the individual packages offer now.

Integration

INTRODUCTION AND REVIEWS BY MICHAEL J. MILLER

Can the whole add up to more than the sum of its parts? That, at any rate, is the theory behind application software suites: The integration of component programs should create a synergy that makes suite users more productive than users of standalone packages.

Integration among applications can take place at many levels. Perhaps the most basic is that developers can give the suite components a common look and feel. Programs can share icons for common functions, have similar menu and toolbar structures, and include dialog boxes that work in a consistent way. Though it may sound trivial, interface consistency can deliver big productivity gains, flatten the learning curve, and reduce overall effort. Each of the suites in this roundup have addressed this issue, to some degree, and the benefits are real.

SHARE AND SHARE ALIKE

In the "bad old days" when programs really didn't talk to one another, every product implemented every feature separately. Each program that had a spell-checker typically had both its own spell-check overlay and its own set of dictionaries. In the suites reviewed here,

this has changed. Each suite now shares spell-checkers and dictionaries across all the applications that use them, so you'll need to add *workstation* or *CD-ROM* to the user dictionary only once.

Other modules, such as graphics and charting engines, can be shared as well. This is good for developers, who now have to do the job only once per suite, rather than once for each application. Of course, it's also good for users, who now have to learn only one tool. We are even beginning to see the emergence of OLE objects—such as special effects editors for text—that can be shared among applications, whether or not they are part of a suite. We expect to see a lot more of this in the future.

Another significant integration area is navigation. Each of the suites offers a method of easily launching the component applications and switching among them. Developers have recently begun to include unified installation programs, which greatly speed and simplify the process of installing—and sometimes deinstalling—suite components.

INTEGRATING FUNCTIONS

We're also beginning to see more macros and other devices designed to aid in inte-

The integration of component programs should create a synergy that makes suite users more productive than users of standalone packages.

Borland International Inc./WordPerfect Corp.

Borland Office for Windows (Beta Version)

What is most remarkable about Borland International and WordPerfect's latest entry in the suite wars is not how well integrated the component packages are, but how quickly they have become integrated at all.

When Borland Office for Windows was first announced last spring, it was simply a bundle of the Windows versions of Paradox, Quattro Pro, and WordPerfect. But as of this writing, the two companies were planning on shipping in December 1993 a new collection of updated and much more integrated programs called Borland Office for Windows, Version 2.0.

Version 2.0 will include WordPerfect 6.0 for Windows, as well as the workgroup editions of Borland's Quattro Pro for Windows, Version 5.0, and Paradox 4.5 for Windows. The two Borland products started out with a fair amount in common, such as a consistent look in many areas and a shared Database Desktop for accessing data. WordPerfect, though, had its own distinct look—and little or nothing in common with the Borlanders.

LOOK-ALIKES

In the Borland Office 2.0 marriage, however, through a series of optional new menus and button bars, the partners

have gained some ability to mimic each other's faces: You can replace the Borland-style Speed Bars in Quattro Pro and Paradox with the WordPerfect-like combination of a larger Button Bar and smaller Power Bar—and icons that match WordPerfect's. In fact, Borland reports these will be the default in the Borland Office versions of the programs. You can also use Borland's Speed Bars and choose a button bar for WordPerfect that matches the Borland icons.

Although it's true that this interface-lift is certainly a step in the right

direction, the change is currently little more than skin deep. Beneath that surface, with items such as dialog boxes and menu design, the packages still reflect their distinct heritages. In general, the Borland Office components don't exhibit the same depth of consistency as the majority of the Lotus and Microsoft equivalents do in their respective suites.

ONE-FOR-ALL INSTALL

That's not to say the suite is without integration. For one thing, the packages will now come with a single, integrated installation program that lets you install any or all of the three packages with any combination of install options. Further, the packages now share a common spell-checker and dictionary.

Particularly nice is Desktop Application Director (DAD), Borland and WordPerfect's tongue-in-cheek response to Microsoft Office Manager (MOM). DAD is a floating button bar that lets you easily switch among apps. Unlike Microsoft's and Lotus's equivalent offerings, DAD can be set to remain available on any part of the screen. You can have multiple DAD bars and easily attach any other apps to them. Even nicer, WordPerfect's QuickFinder (a wonderful utility that lets you easily find files on your system) is accessible from DAD. The result is an application switcher that is competitive with some standalone

Window utilities.

One obvious gap in Borland Office, compared with the Microsoft and Lotus offerings, is a standalone presentation graphics package. True, you can create fine charts in both WordPerfect and Quattro Pro, and you can use the new

Presentation Advisors in Quattro Pro to ease and improve your design efforts. But charts alone do not necessarily a presentation make. For full-blown presentations containing lots of text charts and clip art, you're clearly better off with a full-blown presentation package like Lotus's

Freelance Graphics for Windows, Microsoft PowerPoint, Software Publishing Corp.'s Harvard Graphics for Windows, or WordPerfect Presentations.

Workgroup integration is provided through Borland's Object Exchange (OBEX) technology. OBEX is a publish-and-subscribe data-distribution system that works over any of the popular LAN-based e-mail systems—or even via MCI Mail. To use OBEX, you set up accounts on a LAN or use existing e-mail accounts, whereupon one person can then “publish” either the results of a Paradox query or a page (or pages) from a Quattro Pro notebook. One or more recipients can then “subscribe” to the published information, receiving automatic updates as they are published. Users can also make use of a version control feature to manage these subscribed elements. OBEX is, in effect, a special multiuser version of DDE with its own easy-to-use interface, the Workgroup Desktop.

OBEX is unusually flexible in its mail-system support, but it does have limitations. You can send full pages, notebooks, or complete queries, and you must pub-

lish these from within the spreadsheet or database and then actually send them from your OBEX “post office.” Also, a Send Immediately option would greatly simplify the process. Users have to depend on OBEX-enabled applications for these transmissions, not on regular e-mail messages—the route Lotus and Microsoft take in their workgroup-enabling features.

In Borland Office 2.0, WordPerfect is slated to include its own Workgroup Desktop. This promises to let you use OBEX-published sheets and queries in WordPerfect tables. The feature was not available for testing as of press time.

With common installation procedures, more common icons, DAD, and OBEX support being built into WordPerfect, Version 2.0 represents a major step forward. The programs still aren't as similar as those in the other suites, but the package itself indicates that Borland and WordPerfect are serious about integration.

Lotus Development Corp.

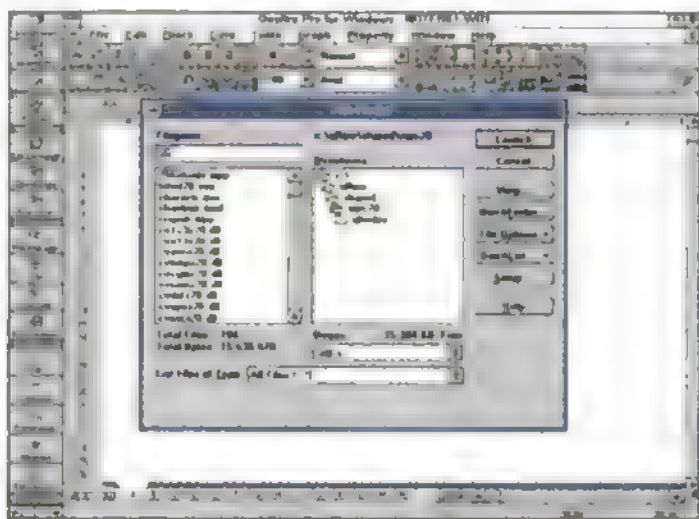
Lotus SmartSuite for Windows

As the competition for consistency among suite applications has heated up, Lotus Development Corp. has led the way. Lotus SmartSuite for Windows, Version 2.0, and its successor, Version 2.1, boast applications that share many of the most impressive UI components around.

SmartIcons, for example, serve as a standard feature in all of Lotus's primary Windows-based products. These dedicated task buttons appear in customizable groups; you can add or remove them as you see fit, and in all Lotus SmartSuite applica-

tions—except Freelance Graphics for Windows and Lotus Approach for Windows—you can move the SmartIcon panels to any edge of the screen or simply let them float. There are 26 common icons across the entire suite, and each application has many more. Also, most of the

In the Borland Office 2.0 marriage, the partners have gained some ability to mimic each other's faces.

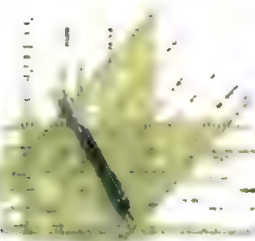


Borland Office's Desktop Application Director (DAD), at screen left, allows access to WordPerfect's File Finder in a Quattro Pro context.



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SUMMARY OF FEATURES

Windows Application Suites

Products listed in alphabetical order

■ = YES □ = NO

Borland Office for Windows
(beta version)*

Borland Office, \$395, is restricted to a single user and can be installed on multiple systems. It provides a navigational icon bar and a common install program. Long-range plans include a common macro language.

Shared resources include standard and user spell-check dictionaries, Desktop Finder, and TextArt. Database Desktop and a graphing and charting engine are shared by Paradox and Quattro Pro only.

Lotus SmartSuite for Windows

Lotus SmartSuite, \$795, is restricted to a single user and can be installed on multiple systems. It has a navigational icon bar but no common install program. A common macro language is planned.

Shared resources include standard and user spell-check dictionaries, Annotator, LotusSound, Media Manager, Dialog Editor (Ami Pro and Lotus 1-2-3), and various features of the SmartSuite applications (except Approach) via Ami Pro macros.

Microsoft Office

	WORD PROCESSING PACKAGE WordPerfect for Windows	SPREADSHEET PACKAGE Quattro Pro for Windows, Workgroup Edition	DATABASE PACKAGE Paradox for Windows, Workgroup Edition	WORD PROCESSING PACKAGE Ami Pro for Windows	SPREADSHEET PACKAGE Lotus 1-2-3 for Windows	DATABASE PACKAGE Lotus Approach for Windows	PRESENTATION GRAPHICS PACKAGE Freelance Graphics for Windows	WORD PROCESSING PACKAGE Microsoft Word for Windows
Version	6.0	5.0	4.5	3.01	4.01	2.1	2.01	6.0
Information Sharing								
DDE client/server	■	■	■	■	■	□	■	■
OLE 1.0 client/server	■	■	■	■	■	■	■	■
OLE 2.0 support	□	□	□	□	□	□	□	■
Acts as OLE 2.0 container (client)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	■
Acts as OLE 2.0 component (server)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	■
Objects can be dragged in and dragged out	N/A	N/A	N/A	N/A	N/A	N/A	N/A	■
Allows OLE automation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	■
Messaging Support								
Application has send-mail option	■	■	■	■	■	□	■	■
VIM	■	■	■	■	■	N/A	■	■
MAPI	■	■	■	□	■	N/A	■	■
MHS	■	■	■	□	■	N/A	■	□
Public	■	■	■	□	□	N/A	□	□
Workgroup								
Routing technology	None	None	None	Lotus Notes	Lotus Notes	None	Lotus Notes	VIM/MAPI
Other object-sharing technologies	OIBEX	OIBEX	OIBEX	Lotus Notes F/X	Lotus Notes F/X	None	Lotus Notes F/X	None

N/A—Not applicable. The product does not have this feature.

* The suite includes some beta-version integration features; individual applications are complete as standalone products.

Lotus SmartSuite applications have a common status bar on the bottom of the window, providing quick access to options such as styles, fonts, sizes, and the icon palette displayed. As Lotus has acquired new products—most recently Lotus Approach and Lotus Organizer—the company has equipped each with SmartIcons and (with the exception of Organizer) a status bar before adding it to the suite.

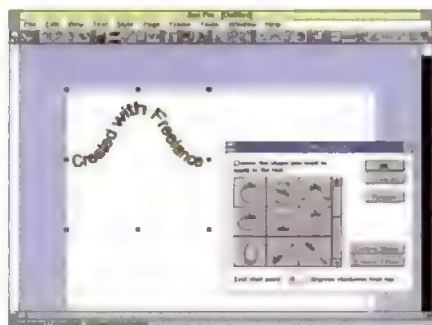
Lotus has also made a clear effort to make the menus and dialogs consistent among its products. The company has made a good beginning, but some room for improvement remains. For instance, users of Lotus 1-2-3 change the size and style of text from the Style menu, but users of Ami Pro and Freelance access those same options from the Text menu.

And both of those packages have Style menus that are used for other things. In general, the menus and dialogs in 1-2-3 looked most up-to-date at press time, with Ami Pro looking somewhat dated—as you might expect from the release dates of these products. In some cases, Approach and Organizer look and behave differently from the other three products, probably reflecting their more recent acquisition by Lotus.

Although Lotus SmartSuite lacks a single installation program (the appli-

cations must therefore be installed individually), the several installation programs do look and work much the same. Once installed, the applications share a common spell-check dictionary.

For the most part, the individual programs in Lotus SmartSuite use standard Windows features—including the Clipboard and OLE 1.0—for integration. Though OLE 2.0 features, such as in-place editing, are not available to the suite as a whole, Ami Pro has long provided this type



A SmartSuite Bonus Pack macro makes Freelance's curved-text tool available within Ami Pro.

user interface, to mail-enabling applications, to pioneering workgroup integration. Others have followed, and though they may be more advanced in some areas, Lotus is continuing to improve its integration at a rapid pace.

Microsoft Office Professional

The successful push toward consistent design of menus and toolbars is obvious in the new versions of Excel, PowerPoint, and Word—and in Microsoft Project, which is not part of the suite. They also share a feature called Tool Tips, small help balloons that identify the function of an icon when you briefly rest your mouse pointer on it. The added interface consistency is a huge benefit for anyone who uses two or more of these applications. The improvement is so clear that the older versions, such as the currently shipping PowerPoint, Version 3.0, really look like they don't fit anymore.

Microsoft Office Professional also includes Microsoft Access 1.1, which has not yet been updated to share the look and feel of the newer programs—although Microsoft reports this will happen within the year. Users can buy the standard Microsoft Office—without Access—for \$750.

Beyond interface consistency, much of Microsoft's integration effort is centered on OLE 2.0. You can easily insert an Excel table or chart into Word in any of several ways: You can use the standard Insert Object menu, drag and drop charts or ranges from Excel into Word, or click the new icon in Word that creates an Excel table within your document. In all cases, you then can edit the Excel "object" in place: When you double-click on the object, you get Excel's menus and toolbars, but you're still working in your

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COVER STORY

Windows Application Suites

Word document. This really is a superior way of combining data to create a compound document.

The same kind of integration already works between PowerPoint and Word, and it should work between PowerPoint and Excel, though we'll have to wait for the final software to verify this.

It seems clear that Microsoft expects most users to work with Excel, PowerPoint, and Word together. One clue to this expectation is that the individual packages lack some features their standalone peers have—presumably because the other members of the suite will make up for it. Word, for instance, does not have the built-in spreadsheet functions of WordPerfect for Windows, but you can insert Excel instead. And PowerPoint has no table feature; you instead insert tables from Excel or Word.

Excel and Word tables have different capabilities, so there's a tradeoff—one that WordPerfect doesn't require.

COUNT ON MOM

Further integration is provided by Microsoft Office Manager (MOM), a shell program that places icons for the suite components at the top of your screen, letting you easily launch and switch between them. MOM gives you quick access not only to the Microsoft applications but also to Program Manager and File Manager. You can set MOM to be available at all times, and you can customize the icon bar. You can even add any third-party program. There is a centralized installation program, although Access installation remains separate.

Microsoft has also built in some application-specific integration features. For example, an icon in PowerPoint lets users convert their presentations to reports in Word. A similar function can be added to Word to convert reports to presentations. To gather records from an external database, you can use Microsoft Query, a subset of Access that's built into Excel and Word. In Word, you reach Query through

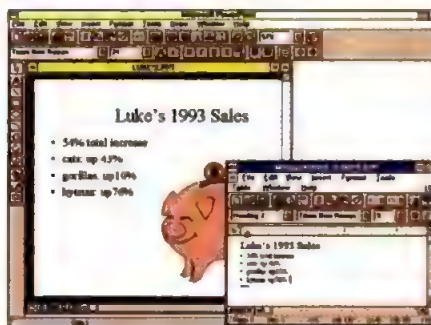
Mail Merge. (Even if you have Access installed, Word will still use Query.) For Excel, you would run Query or Access separately. Also, the suite components share a number of common tools, such as ClipArt Gallery, Microsoft Draw, and Microsoft Graph.

BACK TO BASIC

One of the most potentially powerful levels of integration to emerge in Microsoft Office Professional is a new scripting language called Visual Basic, Applications Edition (VBA). Today, VBA works only with Excel, although Microsoft reports it will eventually add the language to Project and Word. Not only can VBA work with Excel itself, it can also—via OLE automation—control other applications, including Word.

Unlike the other suites, Microsoft Office—Professional or not—includes a license for an e-mail client, Microsoft Mail. (The applications in the Borland and Lotus suites do support e-mail and other connectivity options). Excel, PowerPoint, and Word are all mail-enabled: You can compose messages and attach documents from within those applications. Using MAPI or VIM, you can also attach routing slips to documents, sending messages to groups of users sequentially or simultaneously. But beyond this, the applications do not currently support much workgroup activity, as they lack the distribution capabilities of Lotus Notes F/X or Borland's OBEX.

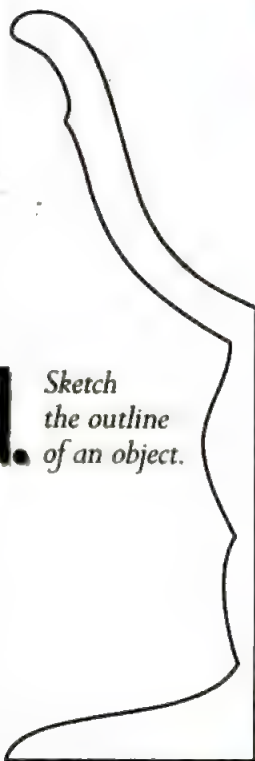
Rather, the focus of Microsoft Office Professional is on creating a compound document on a single user's desktop. Thanks to great consistency and OLE integration, the new versions of the component programs—along with MOM—succeed very well at meeting that goal. There's more work to be done in applications integration, but for now, Microsoft seems to be charting many of the paths other suite vendors will take in the future. □



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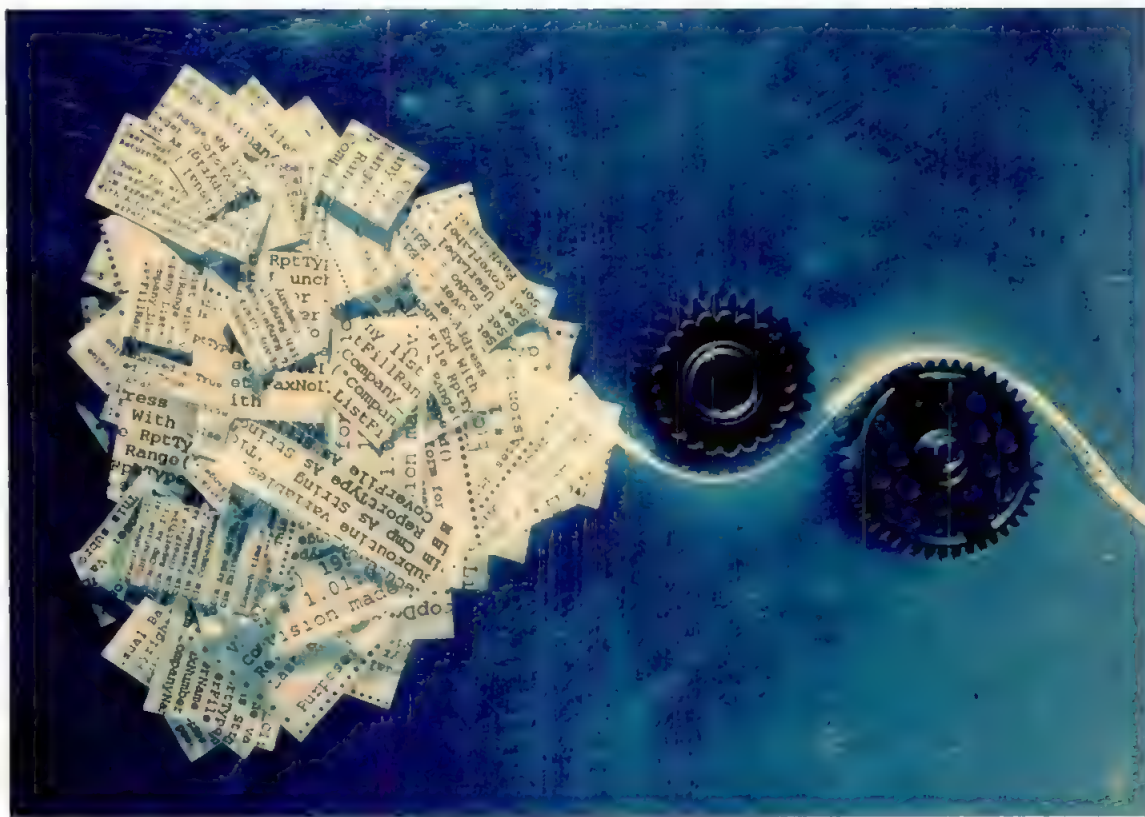
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APPLICATIONS DEVELOPMENT

Cross-Application Macro Languages



You're still asleep—it's 5:00 A.M.—but your PC is wide awake, downloading stock prices from an on-line service, crunching and analyzing the captured data, charting market trends, and faxing a nicely formatted summary to your boss. Where did this miracle application come from that wraps so many powerful functions into one? You wrote it yourself using standard business programs

Macro languages offer the glue, bolts, and nails for building custom compound applications from off-the-shelf software.

by Paul Bonner

Cross-Application Macro Languages

as a resource.

Don't dismiss this scenario as fantasy. The reality of compound applications—programmatically linked applications that automate vertical tasks—is almost this good, if a little messier. Today, you can build and distribute compound apps using off-the-shelf Microsoft Windows and OS/2 software as the raw material. The glue that holds the parts together—cross-application macro languages and underlying operating system features like multitasking, DDE, and OLE—is all in place.

Rosy expectations of easy development need to be tempered with a grain of salt, however. Our testing showed that even the best tools fall short of the mark in combining ease of development with robust, flexible operation. We also found that complex projects demand a real investment of programming effort.

Yet, compound applications still represent an important new direction in applications development. They're part of the same trend as OLE 2.0 compound documents—a move from a computing model built on discrete applications toward one based on task-oriented or process-based systems.

OUR TEST LINEUP

To test the current crop of cross-application macro languages, we scripted a compound application much like the one described above (for details, see the sidebar "How We Tested"). To select products for testing, we sent our script to all vendors of Windows and OS/2 application-integration tools we were able to identify. Those who

felt their products offered the required features were invited to participate.

Six products were considered up to the task: Bridge Toolkit for Windows, Version 3.1, from Softbridge; The Norton Desk-

top 3.0 for Windows, from Symantec Corp.; ProdeaSynergy, Version 1.1, from Prodea; PubTech BatchWorks, Version 2.02, from Granite Software; Watcom VX-REXX, Version 1.01, from Watcom International Corp.; and WinBatch, Version 4.0, from Wilson WindowWare.

We also tested a late beta version of the new cross-application macro language Microsoft Visual Basic, Applications Edition. This language is built into Microsoft Excel, Version 5.0, a new release scheduled to ship as this article went to press (for more information, see the sidebar "Microsoft Visual Basic, Applications Edition"). Two additional products that only partially met our

requirements—Power Launcher, Version 2.0, from hDC Computer Corp., and ProKey for Windows, Version 1.5, from CE Software—are also covered in the sidebar "Alternative Routes: Power Launcher and ProKey for Windows."

Unfortunately, we were unable to test Central Point Software's PC Tools for Windows, Version 1.0 (\$99.95), which includes a capable scripting language and batch environment, because the company could not spare the resources necessary to participate.

COMMON TRAITS

The reviewed tools vary widely in scope and power, but most share several common attributes. These include a simple BASIC-like syntax, facilities for launching other applications and hiding or moving the windows of other applications, and the ability to send keystrokes or DDE messages to other applications.

In addition, most provide a range of string- and array-handling capabilities, basic file management, time and scheduling functions, a keystroke or mouse recorder, and the ability to create simple user interfaces or dialog boxes. But the implementation of these features and their value for automating other applications are all over the board.

For instance, nearly all the scripting tools we looked at can create some sort of custom user interface. But in many cases, that capability is limited to static dialog

IN THIS REVIEW

<i>Bridge Toolkit for Windows, Version 3.1</i>	206
<i>The Norton Desktop 3.0 for Windows</i>	212
<i>ProdeaSynergy, Version 1.1</i>	216
<i>PubTech BatchWorks, Version 2.02</i>	226
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<i>WinBatch, Version 4.0</i>	240

HIGHLIGHTS

Cross-Application Macro Languages

NEED TO AUTOMATE a routine but complex task under Windows or OS/2, one that involves several software applications from different vendors? The packages we review here make it possible for you to write compound applications—custom apps that bring together several off-the-shelf software packages to deliver tailored functionality.

IT WASN'T EASY and often wasn't pretty building our sample app, which shows that the promise of application integration has not yet been fulfilled completely. We found that the range

of programming skills you'll need and the power and elegance of your applications can vary widely. Still, power users should be able to produce at least simple scripts with these tools.

SOME OF THESE BATCH LANGUAGES send simple keystrokes to communicate with applications, making your macro scripts less flexible and more prone to being derailed. More advanced packages communicate directly with Windows dialogs and take advantage of DDE and OLE capabilities for more robust operation.

Some of the latest packages offer an alternative, programming-free paradigm. You construct scripts using simple icons and arrows, while the automation product determines how to tell each application to do what you want.

DISTRIBUTING SCRIPTS is another matter. Some packages offer a compiler so you can distribute .EXEs free of charge to as many users as you wish. Others require runtime licenses for distributed apps, which can get pricey if you plan to deploy many copies.

boxes where the user's actions cannot be evaluated until the dialog box is closed. Other tools offer far more flexible dynamic dialog boxes, which allow the script to respond to the user's choices before the box closes.

Similarly, while a keystroke or macro recorder is fairly common among these tools, its implementation is different in every case. Some products record only keystrokes or don't offer the ability to edit recorded scripts. Others provide full editing capability and can record both keystrokes and mouse movements. Some packages can even record the control ID number of the button or menu item selected by the user. Incorporating this information into a script lets the script run smoothly even if the position of the menu item or command button changes.

Distribution is another important point of difference. While all tested products let you distribute finished applications in some fashion, not all offer a compiler for creating standalone .EXE files for free distribution. In some cases, substantial license fees are involved.

TRIAL BY TEST SCRIPT

In testing, each tool had to create an application that could accept user input; drive spreadsheet, word processing, communications and fax programs; move data between each of the programs; and, to a limited degree, branch based on the contents of the data. While each reviewed tool was able to complete the script successfully, our reviewers found all the products wanting in several areas.

First and foremost, these tools demand programming skills, so ease of use remains elusive. While power users will be able to accomplish some tasks, big projects require knowledge of standard programming concepts like flow control, error handling, and string and array handling, as well as some knowledge about Windows' task- and window-management facilities.

Robustness was another common concern. Because the reviewed products, with the exception of ProdeaSynergy, have lit-



EDITORS' CHOICE

- *For Windows.* ... **The Norton Desktop 3.0 for Windows**
- *For OS/2.* **Watcom VX-REXX, Version 1.01**

In a field of impressive packages, Symantec's ScriptMaker, the batch language included with The Norton Desktop 3.0 for Windows, really stands out. ScriptMaker's powerful syntax is closely modeled on Microsoft Visual Basic but includes numerous extensions

for manipulating windows and communicating with applications. Its companion Desktop Editor provides a slick integrated development environment, and the included compiler creates tight executables that can be freely distributed. What's more, ScriptMaker is only one feature of this many-sided, inexpensive package.

Although Watcom VX-REXX, Version 1.01, is the only OS/2 product we reviewed, its features and power would shine in any environment. An elegant yet powerful visual programming tool based on REXX, OS/2's procedural language, VX-REXX lets you build graphical front ends using standard controls, attach event-driven code to interface objects, and test your application in an interpreted environment. Niceties include

drag-and-drop programming and a help compiler. Full-featured debugging tools are provided and programs can be compiled into executables or run using OS/2's REXX interpreter. For integrating either "REXX-aware" or standard OS/2 apps, this package is a must.

Among other tested products, Prodea's ProdeaSynergy, Version 1.1, offers a compelling alternative paradigm where icons, conditional arrow symbols, and a database of application definitions replace a programming language. Softbridge's Bridge Toolkit for Windows, Version 3.1, and Wilson WindowWare's WinBatch, Version 4.0, are traditional batch languages that offer many strengths, although Bridge Toolkit lacks a compiler and WinBatch lacks an editor.

tle or no intrinsic knowledge of the applications they are automating, their ability to recover from application errors is nearly nonexistent. In fact, many of these tools have difficulty even detecting that an error has occurred. This means more coding on the developer's part if the script is not to become stalled at the first error or unexpected message box it encounters.

Long development times were also the order of the day. All this coding and error handling takes time—too much time in the minds of most of our reviewers. Even the vendors who coded our test application frequently required extra time in order to finish. Then, the scripts often required sev-

eral hours of tweaking in order to run on the reviewer's PC. Compared with the development cycle of, say, C++, a few days may not seem daunting. But the development effort required still removes these tools from the grasp of the casual user.

ProdeaSynergy was the exception to many of these objections, since it essentially requires no programming. But it is arguably the least flexible of these tools because it provides support for only a limited number of applications, and lacks several features many developers would consider essential (including the ability to create dialog boxes).

ENVIRONMENTAL CONCERNS

For cross-application programming tasks, the OS/2 environment has a distinct edge over Windows. This is thanks to IBM's promotion of REXX as a systemwide procedural language. Developers using a

Our Contributors: SHERYL CANTER and BARRY SIMON are contributing editors of *PC Magazine*. PAUL BONNER is a freelance writer and the author of *PC Magazine Visual Basic Utilities*. GABRIELLE GAGNON is a systems consultant for the Dreyfus Corporation. THOMAS MACE was the associate editor in charge of this story, and JAY MUNRO was the project leader.

Cross-Application Macro Languages

Suitability to Task: Cross-Application Macro Languages

Each of the integration tools reviewed in this story can link Windows or OS/2 programs into compound applications. But language features, capabilities, and ease of use among them vary widely.

User interface (UI) creation is one of the most important facets of building any compound application. We evaluated the tools included for constructing custom dialogs and the breadth of standard Windows (or Presentation Manager) controls available. Dynamic dialogs that act on user input while remaining open and support for third-party UI tools are both pluses

The rating in **professional development** is based on the power and depth of a product's programming language. Evaluated features include available control structures and variables, support for arrays, and the depth of Windows-specific functions offered. Also important were the range of methods by which the package can communicate with applications—keystrokes, direct dialog manipulation, DDE, OLE—and how well scripts can detect

SUITABILITY TO TASK				
Product Name	POOR	FAIR	GOOD	EXCELLENT
UI creation	●	○	○	○
Professional development	●	●	○	○
Fast application development	●	●	●	○
Distributed apps	●	●	●	●
Distributed apps	N/A			

N/A—Not applicable. The product does not perform this task.

and recover from application errors. Strong debugging features are also a plus.

Fast application development looks at ease of use. Is the language syntax intuitive? Is an IDE provided and does it offer easy-to-use editing and debugging features? Can you easily add recorded keystrokes and dialogs to scripts? Does the package offer an alternative paradigm to programming?

With **distributed apps**, we indicate how easily and economically compound apps can be distributed to end users. A compiler that can generate royalty-free standalone .EXEs is preferable to an app requiring a runtime module with licensing fees.

Softbridge Inc.

Bridge Toolkit for Windows, Version 3.1

BY PAUL BONNER

One of the most powerful tools for automating applications under Microsoft Windows, Softbridge's Bridge Toolkit for Windows, Version 3.1, boasts superior handling of DOS applications, inter-application communications capabilities among multiple instances of Bridge, and excellent cross-network

messaging capabilities. But some omissions and the package's steep price—\$695, which includes only three runtime licenses for distributing applications—might make it a good choice only for those who need its unique functionality.

Bridge offers a broad set of commands for launching and manipulating other Windows applications, including the ability to send keystrokes and Dynamic Data Exchange (DDE) messages and a variety of window-control commands. It can also assign a name to a particular instance of a Windows application. That lets you direct commands to a specific instance of Notepad, for example, when more than one instance is running.

The BASIC-like Bridge language is easy to pick up and simple to decipher, which means even nondevelopers can automate simple tasks. Variables can be created and assigned values with very straightforward declarations. Bridge includes a healthy assortment of program control structures, including For-Next and While loops, Gosub and Goto statements, and If-Then-ElseIf commands. It offers automatic variable typing, batch language-like variable substitution, and a full set of array-handling and string-handling commands.

BEYOND A PROCEDURAL MODEL

In addition, while most scripting tools are bound to a procedural model, Bridge offers a modicum of event-driven capabilities through the use of On commands—such as On Time, On Key, and On Msg—and Priority commands, which interrupt the normal flow of processing when a specified event takes place. Combining these commands, you can build a script that responds to events such as the use of hotkeys, the closing of a specified window, File Manager file drop events, and time-related events.

Bridge's text editor follows most standard Windows conventions and adds a Record menu that provides access to the Bridge Tape Recorder, and a Paste menu that lets you quickly insert command/function templates or custom dialog box/menu definitions. The editor is not a multiple document interface (MDI) application, but multiple instances of the editor can be run at once for simultaneous development of multiple scripts.

The Bridge Tape Recorder can be

SUITABILITY TO TASK				
Bridge Toolkit for Windows	POOR	FAIR	GOOD	EXCELLENT
UI creation	●	●	●	●
Professional development	●	●	●	○
Fast application development	●	●	●	○
Distributed apps	●	●	○	○

general-purpose scripting tool such as Watcom's VX-REXX can link their scripts to macros written in application-specific implementations of REXX, such as that offered by Ami Pro. Developers can also issue commands to any "REXX-aware" application that registers its environment with REXX.

The picture is more fragmented in the Windows environment. Given the lack of a standard language, several leading vendors are promoting proprietary macro languages—Microsoft Visual Basic, Applications Edition and Lotus Script are prime examples—as part of their application suite strategies.

As the following reviews show, all the tested tools were able to deliver all or most of the goods, despite problems and limitations. Some of them created applications that were both elegant and reasonably robust. We expect significant new entries in the field as new technologies, particularly OLE 2.0, become more common in the near future. Even so, today's tools—warts and all—are well worth a developer's attention.

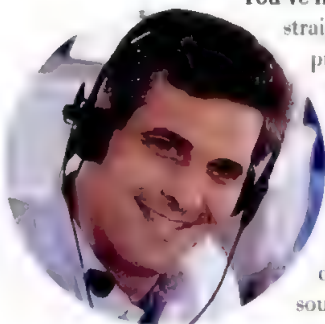


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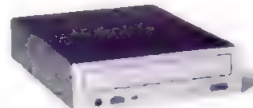
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How We Tested

In the realm of cross-application macro languages, there are many ways to get from point A to point B. So we simply told vendors what we wanted our compound app

to do—download and process stock quotes and alert a remote user to market changes—and let each accomplish the task as best befitted its product.

REQUIRED TASKS

The test scenario required the integration of four off-the-shelf software components: communications, spreadsheet, word processor, and fax. The created application had to dial an on-line stock-quote service at a user-specified time, download and capture standard market data for two selected stocks, parse the data to extract closing prices, pass the data to a spreadsheet and append it to the bottom of a range containing histor-

ical stock data, calculate the difference in closing price since the day before, and create a 30-day high-low-close graph.

Then, the application was required to create a word processor document on letterhead and a text passage alerting the user to either upward or downward stock movement, insert calculated stock price changes in a sentence, embed the 30-day chart from the spreadsheet, and print, e-mail, or fax the document according to user preference.

We also specified a user interface (UI) for entering parameters such as start time; choice of faxing, mailing, or printing output; and fax or e-mail ad-

dress. The UI also had to provide Start and Cancel buttons and a status screen tracking the application's operation. Packages that do not support UI creation could make use of a third-party UI builder.

The packages employed by the test scripts were: Eclipse Fax, Version 1.21, from Eclipse Systems; Lotus Development Corp.'s Lotus 1-2-3 for OS/2, Release 2.0, and Lotus Ami Pro 3.0 for OS/2; Microsoft Corp.'s Microsoft Excel, Versions 4.0 and 5.0, and Microsoft Word for Windows, Version 2.0; PMFax, now FaxWorks OS/2 LAN, Version 1.39, from SofNet; ProComm Plus for Windows, Version 1.02, from Datas-torm Technologies; REXXTerm, Version 2.3, from Quercus Systems; TalkThru for OS/2, Version 2.21, from Software Corp. of America; the shareware program WinCIM, Version 1.0.3; and WinFax PRO, Version 3.0, from Delrina Corp.

used to record either the keystrokes sent to an application or both keystrokes and mouse commands.

Keystroke-only tapes can be converted to script language commands, which means you can edit them or add conditions to their execution. Mouse-and-key-stroke tapes, on the other hand, can only be "played" verbatim as recorded. Neither method records the IDs of controls as they are manipulated, so changes in the configuration of a dialog box (changes in the contents of a list of menu choices, for example) effectively derail recorded scripts that expect controls and options to remain constant.

SUPERIOR CUSTOM DIALOGS

Bridge's excellent dialog box editor offers graphical editing and flexible support for standard Windows controls, bitmaps, and icons in custom dialog boxes. Once a dialog box has been designed, the code to create it can be pasted into a Bridge script and loaded back into the dialog box editor at any time for modification.

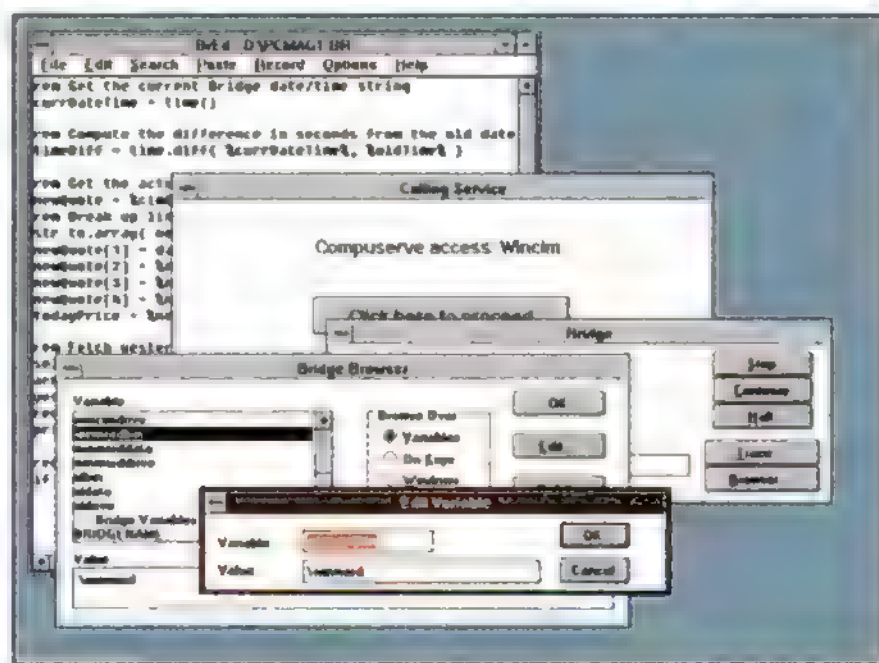
Bridge also offers a Validate option for dialog boxes, which allows the programmer to create more elegant, interactive

solutions than are allowed by languages that process dialog box selections only after the dialog box has closed. For instance, consider a simple dialog box containing a list of files in a list box and a command button labeled Delete. Using

script would have to recreate the dialog box before the user could select another file for processing.

The Bridge Editor offers acceptable if not comprehensive debugging facilities. These include the ability to single-step

through a script, and a Trace command that echoes each command as it executes to the Bridge window or to a printer or file. The editor offers no syntax checking, but during execution of a script it identifies errors and offers the option to continue execution, turn on step or trace modes, or make use of a variable browser to examine or edit the value of the variables used by the script. Unfortunately, the debugger does not let you edit the line in which the error occurs, so debugging can be a trying



Bridge's debugger lets you step through a script and examine or modify the value of any variable or array element.

the validation facility, the script could respond to the Delete button by deleting the selected file, and then refresh the file list, allowing the user to select another file immediately. Without the validation facility, the dialog box would have to close before the file was deleted, and then the

process.

DOS APPLICATION SUPPORT

With an included TSR, Bridge can send keystrokes to a DOS application, read a DOS application's screen, respond to screen changes or user input, and ex-

Cross-Application Macro Languages

FACT FILE

**Bridge Toolkit for Windows,
Version 3.1**

Softbridge Inc., 125 Cambridge Park Dr.,
Cambridge, MA 02140; 800-955-9190,
617-576-2257; fax, 617-864-7747

List price: \$695 (includes three-user runtime license).

Requires: 1MB RAM, 1.4MB hard disk space, DOS 3.1 or later, Microsoft Windows 3.x.

In short: Powerful but pricey. Bridge offers advanced support

for controlling both Windows and DOS applications, plus interapplication and internetwork messaging. It provides some support for event-driven programming using dialog-box validation and On Event commands. However, its high price and lack of a free runtime module make it an expensive choice for users who don't require its most advanced capabilities.

ON READER SERVICE CARD

change data between Windows and DOS applications using the Clipboard. This ability to read the DOS application's screen and to respond to user input gives Bridge Toolkit a far greater ability to interact with DOS applications than tools that are limited merely to sending keystrokes to DOS boxes.

Cross-network messaging is another of Bridge's strengths. As long as you have the Bridge Message Controller module running on both your PC and the target PC, Bridge can send commands or messages across the network and launch scripts or control applications on remote PCs.

Bridge's documentation is excellent, with thorough manuals, a tutorial, example applications, and full on-line help. But while the latest iteration of the product adds some significant new capabilities, including the ability to call external DLLs, support for File Manager drag-and-drop messages, and array-manipulation capabilities, the product has not evolved fast enough in some areas. It fails to offer support for OLE or multimedia commands, and its use of standard sendkeys methods as opposed to control IDs may lead in some instances to scripts getting off the track. In addition, the package is expensive when

compared with other products in this category. So unless you need Bridge's unique functionality, you might be better off looking elsewhere.

Symantec Corp.

**The Norton Desktop 3.0
for Windows**

BY BARRY SIMON

One of the many tools in Symantec Corp.'s recently released \$179 The Norton Desktop 3.0 for Windows (NDW) is ScriptMaker, a powerful, well designed batch language based on technology licensed from Summit Software. Notable features include what Symantec calls its Visual Basic-like syntax, a slick integrated development environment (IDE), the ability to capture menus and dialogs from other applications, and the ability to compile scripts into standalone executables.

PRETTY BASIC

The ScriptMaker language is a BASIC dialect that closely parallels Microsoft's Visual Basic. This means that complex control structures found in modern variants of BASIC—IF...THEN...ELSE, SELECT...CASE, FOR...DO, and WHILE...WEND—are also found in ScriptMaker. Arrays, including multidimensional arrays, are supported, and long and real integer types are also allowed, al-

though user-defined variables are not.

Many functions from Visual Basic that are intrinsic to the language are also available. This includes everything from numeric and string functions, such as Mid\$ and Atn(), to the Lib calls used to invoke external DLLs.

ScriptMaker parts company with Visual Basic in that ScriptMaker doesn't support event-driven forms or third-party VBX controls. It does provide a dialog editor that lets you create dialogs with the most basic controls, but not all Visual Basic controls are present. For example, controls for Drive and File list boxes are missing. Moreover, the properties and methods of Visual Basic controls and the event handlers are not supported in NDW. Instead, the dialog editor generates code that describes the dialogs (including assigned variables), and the di-

dialogs change the values of the variables.

ScriptMaker is quite different from the batch languages in NDW, Versions 1.0 and 2.x, which were licensed variants of older versions of Wilson

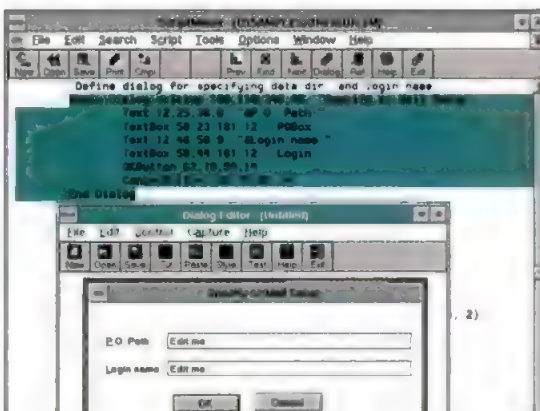
WindowWare's WinBatch. By adding calls to a DLL supplied with NDW, however, you can also run scripts written with NDW 2.x or WinBatch 3.0.

NDW-SPECIFIC FUNCTIONS

Of course, if the language were just a subset of VB, it wouldn't be a batch language—something made primarily to control other applications. So ScriptMaker includes extra functions for interacting with applications. One particular class of these functions all begin with Win: WinActivate, WinClose, WinList, WinMaximize, and WinMove. WinList, for example, gives you an array with the names of open windows. Another offers direct support for DDE (rather than through properties of controls as in VB).

The most powerful language extensions involve communicating with or reading information

SUITABILITY TO TASK				
The Norton Desktop for Windows				
	POOR	FAIR	GOOD	EXCELLENT
UI creation	●	●	●	○
Professional development	●	●	●	●
Fast application development	●	●	●	●
Distributed apps	●	●	●	●



Norton's Desktop Editor doubles as a slick IDE. The Dialog Editor lets you build dialogs or capture existing ones.



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3M Reliability

▪ Alternative Routes: *Power Launcher and ProKey for Windows*

by Barry Simon

There are always other ways to skin a cat. As an alternative to full-fledged batch languages, many programs can make ideal automation tools for smaller projects. We looked at two that stand out: Power Launcher, notable for the multitude of ways in which you can launch its scripts, and ProKey, the only hotkey-driven Microsoft Windows macro-recording program with editable macros.

POWER LAUNCHER

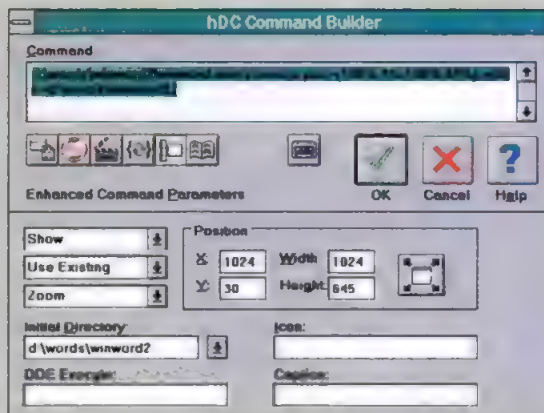
hDC Computer Corp.'s Power Launcher, Version 2.0, provides scripts called *ecommands* (for enhanced commands) that do not offer branching capability, string manipulation, or arithmetic. But within those limitations, *ecommands* are very powerful. With them you can launch, move, resize, show, and hide applications as well as send keystrokes, get user input, insert the date or time, or even play a .WAV file.

Power Launcher also offers a mind-boggling number of ways to launch these scripts. You can place a hierarchical list of scripts on the system menu of any application. By running extra utilities provided in the package, you can assign *ecommands* to keystrokes, mouse actions, or to user-defined button bars. The *ecommand* syntax is a little obscure, but the tools for creating *ecommands* are so well conceived that you are mostly protected from the language. Editing a script, however, does require coping with the syntax.

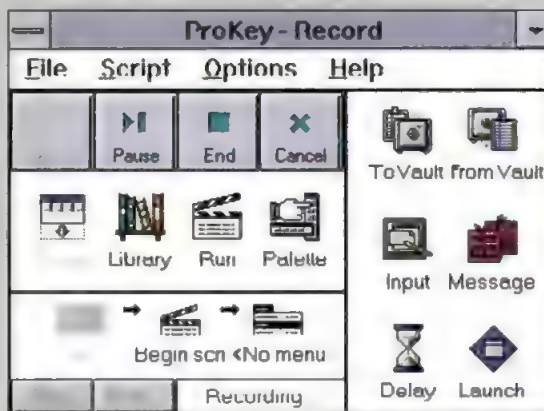
While scripts are the core of Power Launcher, the program provides a lot more than just scripting. You can set up multiple virtual desktops and maneuver between them as part of the scripts. Power Launcher's command bar also includes a current directory indicator, a button to report on system resource usage, and another button to

launch a program to manage your multiple desktops.

Power Launcher is the wrong hammer for large automation projects, but it is a fantastic tool for many intermediate-size tasks.



Power Launcher's *ecommand* syntax can be obscure, but the Command Builder helps shield you from the language.



ProKey's sophisticated macro recording tools go far beyond the Windows Recorder and include limited editing.

PROKEY FOR WINDOWS

CE Software's ProKey for Windows, Version 1.5, is a Windows version of the classic DOS keyboard macro program. You turn on macro recording with a hotkey (or from a menu), and you can launch macros with a hotkey or from a run list. This offers the power of on-the-fly recording and the

simplicity of not having to cope with a language—features that have made the standard Windows Recorder popular with some users.

But ProKey offers much more, including the ability to get user input during playback, insert pauses, and store multiple Clipboard items in ProKey memory (to avoid switching back and forth between applications). It also lets you put all macros associated with a given application on a

button bar. For many users, just the fact that you can assign macro-record start and stop to a hotkey makes ProKey a most attractive alternative.

ProKey even goes further with its macro-editing capabilities. This is not full-fledged editing but the ability to single-step through your macro while inserting new actions and deleting old ones. Indeed, you can't edit macros except by tracing through them—running them and editing during the process. And if you mistype macro text, you need to add a new text item and delete the old. But if the record and playback macro mode appeals to you, ProKey is by far the best option available. □

► FACT FILE

Power Launcher, Version 2.0
hDC Computer Corp., 6742
185th Ave. NE, Seattle, WA
98052; 800-321-4606.

List price: \$99.95.

Requires: Windows 3.x.

Circle 474 on reader service card

► FACT FILE

ProKey for Windows, Version 1.5
CE Software Inc., P.O. Box 65580,
West Des Moines, IO 50265; 515-224-
1995.

List price: \$79.

Requires: DOS 3.3 or later, Windows
3.1.

Circle 475 on reader service card

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KUP-0038

Cross-Application Macro Languages



FACT FILE

The Norton Desktop 3.0
for Windows

Symantec Corp., 10201 Torre Ave.,
Cupertino, CA 95014; 800-441-7234,
408-252-3570; fax, 408-252-4092



List price: \$179.

Requires: 386-based PC or better, 4MB RAM, 15MB hard disk space (2MB for batch language only), DOS 3.3 or later, Microsoft Windows 3.1

In short: Great for automating

Windows applications. With its pleasant IDE, powerful record capabilities, royalty-free .EXEs, and even some Visual Basic compatibility, The Norton Desktop is one of the best cross-application macro tools available. Still, it would be nice to have debugging capabilities and better handling of errors in applications.



in other applications. While you can use the SendKeys or QueKeys commands, it is often better to use the Menu function to invoke menu items directly. Similarly, NDW scripts can directly interact with dialogs in other programs: SetCheckBox and GetCheckBox, for example, set or get the state of a check box (if the required dialog ID is known).

THE NEW IDE

One of the components of NDW is the Desktop Editor, a Microsoft Windows-based text editor with all the trimmings: multiple document interface, multilevel undo, button bar, remembered search strings, searches on regular expressions, the ability to assign menu commands and recorded keyboard sequences to arbitrary hotkeys, and the ability to compare two text files for differences.

When you install NDW, the program creates an icon for launching the ScriptMaker IDE. A closer look reveals that this is just the Desktop Editor with a /b parameter. All of the Desktop Editor's rich features are available to you in addition to added menu items that will invoke language help and the compiler, and new button bar buttons that will compile, run, and abort scripts.

The Compile button compiles to memory and provides syntax checking of the

script. If there is an error, the cursor moves to the offending line. Syntax checking during a compile is about the only explicit debugging tool available, however. If you need to track down problems, you are reduced to debugging the old-fashioned way, with message boxes and pauses placed in the code to uncover what went wrong.

Adding to potential debugging problems is the fact that, unlike VB and some other modern BASICs, NDW does not give you the option of forcing variables to be predeclared. So a typographical error when inserting what you thought was the name of an existing variable can introduce a new uninitialized variable with strange behavior that is hard to track down. Most other batch languages can't force predeclaration either, but given Visual Basic's influence on ScriptMaker, an analog to Visual Basic's option-explicit command would have been welcome.

FOR THE RECORD

Recording is one of NDW's strong points. The program can record menu choices or the state of a dialog box. Indeed, the only efficient way to get the dialog IDs needed in dialog box-specific functions is to run the recorder, which grabs that information for you. You invoke the recorder from the ScriptMaker menus, at which point ScriptMaker minimizes itself and pops up a little palette with Pause/End buttons. You can choose to have the recorder add comments that explain what the recorded code is doing.

If you want to run scripts outside the IDE, you need to compile them to executables. In order for these .EXEs to run, they require several DLLs that take about 400K of space, but you can freely distribute the DLLs with your compiled applications. This makes ScriptMaker particularly attractive for corporate developers.

Of course, NDW has a lot more to offer than just its script language. Included are a desktop/application launcher, file manager, icon editor, mini-PIM, calculator, backup utility, virus checker, disk doctor—virtually everything. ScriptMak-

er itself offers one of the most economical, easy-to-use, and powerful automation tools available for Windows.

Low price and the inclusion of a compiler for free application distribution make this package virtually irresistible.

Prodea

ProdeaSynergy, Version 1.1

BY SHERYL CANTER

ProdeaSynergy, Version 1.1, is a unique new entrant into the world of Microsoft Windows application integration. Like a macro-language product, it lets you create compound applications by controlling a series of standalone programs. But Synergy is entirely visual and uses no language whatsoever.

Instead, icons are used to represent each application to be controlled. Arrows drawn between them determine the flow of execution. Icons and arrows have associated property sheets. By filling them in, you can instruct Synergy to move data into an application or to run a script written in an application's native macro language. Synergy understands how each supported application works and stores the details in an internal database, invisible to the user.

If you stay within the bounds of what Synergy is built to do, working with the program couldn't be easier. But step outside those bounds and you'll hit the wall pretty quickly.

There are no facilities for building a user interface, recording or sending keystrokes, parsing strings, or performing calculations. Third-party products are needed for all of these tasks.

LOOKS SO EASY

One of most challenging aspects of applications integration is figuring out how to control each app. Synergy's greatest strength is that it automatically knows the best way to do this. Applications are controlled via OLE 1.0 or DDE wherever possible, or alternatively through keystrokes. OLE 2.0 automation will be supported in the next release of Synergy.

SUITABILITY TO TASK				
ProdeaSynergy				
	POOR	FAIR	GOOD	EXCELLENT
UI creation	N/A			
Professional development	●	○	○	○
Fast application development	●	●	●	●
Distributed apps	●	●	●	○

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May 25, 1993

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Applications you wish to automate are added to Synergy's internal database by selecting them from a supplied application definition disk. Application definitions are version-specific, and updated definitions are posted on Prodea's bulletin board. Currently, only 27 application definitions are on this disk.

Though all major word processors and spreadsheets are represented, some software categories, notably fax packages, are missing entirely. If you have a fax board set up as a printer device, you can print to it. But when the fax software's addressing window pops up, you'll have to enter the information manually. The format for Synergy application definitions is not public, so you are completely dependent on Prodea to provide definitions for the applications you use.

The application definition disk also includes six generic "Any Application" templates. Five cover generic application types—communications, MAPI, Query, user interface, VIM—letting you control such apps in a few limited ways. If your application doesn't fit any of these categories, you can use the sixth, an "Any Widget" template. You have almost no control over Any Widget apps, however. At most, you can add parameters to the command line when you launch it.



Program icons and arrows are the visual metaphors used to control program flow in ProdeaSynergy.

PUTTING IT TOGETHER

Applications selected from the definition disk appear as icons across the top of Synergy's main screen. Along the left side of the screen is a toolbar that contains items such as the arrows that connect applications, Synergy's variable server, and an icon for print services. Components are

FACT FILE

ProdeaSynergy, Version 1.1
*Prodea, 11095 Viking Dr., #225,
 Minneapolis, MN 55344; 612-942-1000;
 fax, 612-942-1010*



List price: \$495

Requires: 386-based PC or better, 2MB RAM (8MB recommended), 3MB hard disk space, DOS 3.3 or later, Microsoft Windows 3.1, high-density 3.5-inch floppy disk drive

In short: A different kind of car. ProdeaSynergy lets you use visual tools to create compound applications from a list of supported apps. There is no macro language; instructions are given by filling out property sheets. Synergy is very easy to use, but it's limited. At present, the product supports only 27 apps, there is no interface design tool, and you can't record or send keystrokes. The full-priced package must be installed on every PC running distributed apps.

470 A REAL-TO-IMAGINE JOURNAL

placed onto the work area through drag and drop.

Clicking the right mouse button on a component's icon brings up an object-specific property sheet. For spreadsheets or communication programs, you can name a macro to be run; for VIM or MAPI programs you can fill in the e-mail address and subject. The property sheets for "Standard Links" between apps, which are represented by arrows, let you specify the data flowing into the app about to be launched.

Synergy's variable server gives you access to 256 variables. These can be used to pass information among apps using DDE, and can also be used for conditional branching. Variable names must consist of an ampersand followed by one or two capital letters, a terse convention that makes variable names hard to remember.

Arrows with question marks over them (conditional links) are used for conditional execution. The condition, defined in the property sheet, is always a comparison between one of Synergy's

variables and a specified value. If the condition is true, the object the arrow is pointing to will execute. Conditions with an OR are easily depicted—a different conditional arrow is used for each case. AND conditions are more complicated. Since Synergy has no way of depicting compound conditions, you must put do-nothing program icons between conditions.

The compound app represented by the diagram is called a package. To make packages available to users, you publish them in the library. The Synergy Library is actually a separate application, though you can launch it from within Synergy and vice versa. Each library can contain any number of packages, and packages can be grouped together by topic.

MISSING PIECES

Despite its finesse in handling certain tasks, Synergy is missing a number of crucial pieces. The most obvious of these is Synergy's lack of an interface tool for building user-input dialogs. Here, third-party products such as Microsoft Visual Basic or Asymetrix's Toolbook are required. Your chosen interface tool must be able to communicate with Synergy through DDE. Custom-built interfaces can be added to Synergy's app list by using the Any Interface template.

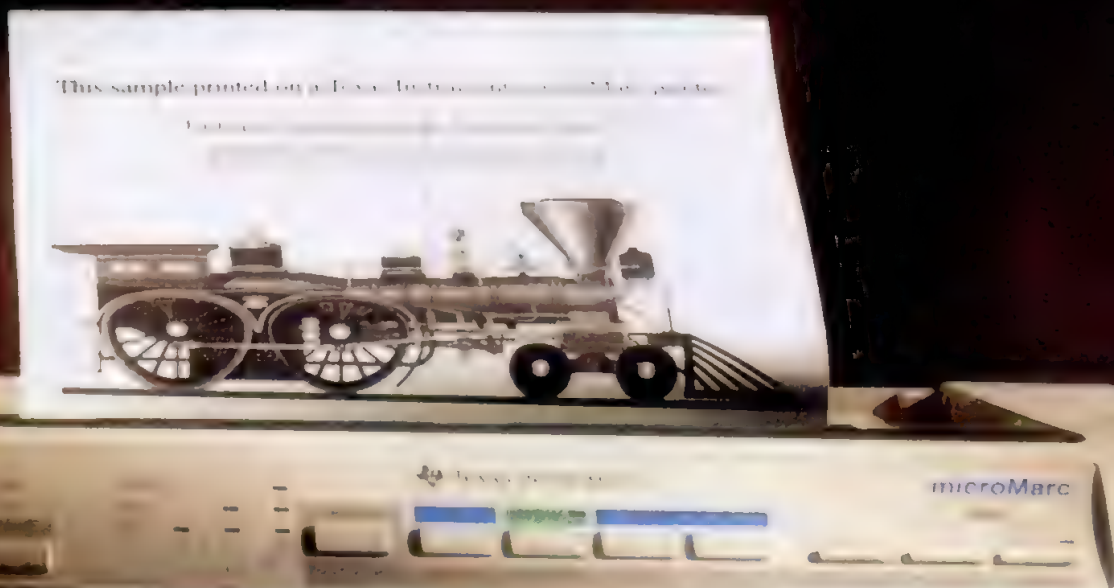
Synergy also lacks the ability to record and send keystrokes—the last-resort method for controlling apps. Prodea suggests using the Windows Recorder for this task via the Any Widget template.

Another downside is Synergy's price. At \$495 for a single-user license, \$4,500 for 10 users, and \$9,875 for 25 users, it is one of the most expensive packages in this roundup. Prodea does not sell a runtime module; you must buy the full developer's package for each PC running Synergy packages.

Synergy does what it is designed to do with exceptional ease, but high price and a lack of functionality stand in its way. If the apps you need to integrate are on Synergy's list, and if all you need to do is use the output from one app as input into another, then Synergy will save you a lot of time. If your needs are more complex, you'll do better with a more flexible and full-featured product.

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Speed ('spēd) *n.* 1. A feature rarely found in low-cost inkjet printers. *example:* In letter quality mode, the **TI microMarc™** printer gives you laser quality printing at twice the *speed* of the HP DeskJet™ printer.



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If you're looking for a printer with a street price under \$300*, you no longer have to settle for poor print quality or painfully slow print speed.

Now, for about the same price as a dot matrix printer, the TI microMarc, with its advanced inkjet technology, will give you the same 300 dpi print quality as most laser printers.

And unlike our biggest competitor, the HP DeskJet, instead of 50 nozzles applying ink to the page, we give you 128 nozzles. Which means that, in letter quality mode, we print text twice as fast. We also give you more memory than they do, for improved graphics. And the benefits don't stop there.

The TI microMarc is also easy to use, thanks to its new high-capacity, easy to replace ink cartridge.

The TI microMarc. It's so quiet, so reliable, so inexpensive to run and easy to use, it can help you get more from your printer than you ever thought possible. At a price you probably never thought possible. For more information or a dealer near you, call 1-800-527-3500.

	TI microMarc	HP DeskJet 500
Speed (in letter quality mode)	300cps	120cps
# Of Nozzles	128	50
Print Quality	300 dpi	300 dpi
Memory	24K	16K
Pages/Cartridge	1400	1000
Weight	12.1 lbs	14.3 lbs

Speed and other chart are based on estimated costs of 11¢/p. *Estimated street price. Dealer prices will vary. microMarc, microWriter and "Experience Your World With Innovation" are trademarks of Texas Instruments. DeskJet is a trademark of Hewlett-Packard. Adobe PostScript and the PostScript logo are registered trademarks of Adobe Systems, Inc. © 1997 TI.

Flexibility (ˌflek·sə·bil·ə·tē) *n.* 1. A feature previously not found in this category. *example:* For under \$800, **TI microWriter™** printers give you the *flexibility* to start with **Adobe® PostScript®** or add it later; the comparable HP 4L does not.



**THE
UNDER \$800
PRINTER,
REDEFINED.**

If you're looking for a printer with a street price well under \$800, you'll have a hard time finding one with as many features as a TI microWriter.

Let's compare it to our leading competitor, HP, starting with basic models. First, take flexibility. Ours lets you add PostScript now or later. With the HP 4L you can't add it at all. Take paper handling. Ours comes with a 250-sheet tray standard, theirs with just a 100-sheet. Speed? We give you 5 ppm, they give you 4. Yet in spite of all this, we still list for hundreds of dollars less.

Now, let's compare high end models. As you'll see from the

chart, the features here are basically comparable—till you get to price. And once again, the TI microWriter is clearly the better value. For more information or a dealer near you, call 1-800-527-3500.

	TI microWriter Basic	HP 4L	TI microWriter PS23	HP 4ML
Print Speed	5 ppm	4 ppm	5 ppm	4 ppm
PostScript	Upgradeable	No	Standard	Standard
Paper Trays	(std.) 250 sheet	100 sheet	250 sheet	100 sheet
	(opt.) 250 sheet	Not Avail.	250 sheet	Not Avail.
List Price	\$599	\$849	\$799	\$1279

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Compatibility (kəmˌpat-əˈbil-ət-ē) *n.* 1. A feature typically lacking in this category. *example:* The new **600 dpi TI microLaser™ Pro 600** printer gives you DOS, Windows, Mac, PCL5 and PostScript® compatibility standard; HP charges hundreds more.



Adobe PostScript

Specifications and features are based on information as of 11/90. *Estimated dealer price. †End-user manufacturer's retail price. \$1499 dealer price includes one year of basic service. All prices are for the printer only. For more information on the TI microLaser Pro 600, visit www.ti.com. "Exceeding Your Expectations" is a trademark of Texas Instruments. Adobe PostScript and the PostScript logo are registered trademarks of Adobe Systems, Inc. LaserJet is a registered trademark of Hewlett-Packard, Inc. Mac is a registered trademark of Apple Computer, Inc. © 1991 TI.

**THE
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Take print quality. We began with true 600 dpi resolution. And then enhanced it with 6MB of memory for improved graphics. Compatibility? We're DOS, Windows and Mac® compatible right out of the box. With all the right languages and interfaces. And with the intelligence to switch these automatically, depending on the environment. Low maintenance? Our new toner cartridge typically gives you 15,000 pages between changes.

Paper handling? Two 250-sheet trays come standard. And finally, value. As the chart below shows, not only do we give you a lot more than our leading competitor, we also charge you a lot less.

So if you're considering a new printer, we invite you to try the new TI microLaser Pro 600. For more information or a dealer near you, call **1-800-527-3500**.

**Ask
About Our \$60
End User
Rebate.***

	TI microLaser Pro 600	HP LaserJet* 4	HP LaserJet 4M
<i>True 600 dpi</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Speed/Processor</i>	<i>8 ppm/RISC</i>	<i>8 ppm/RISC</i>	<i>8 ppm/RISC</i>
<i>Memory</i>	<i>6MB</i>	<i>2MB</i>	<i>6MB</i>
<i>Emulations</i>	<i>PCL5/ Adobe PostScript 2</i>	<i>PCL5E</i>	<i>PCL5E/ Adobe PostScript 2</i>
<i>Compatibility</i>	<i>DOS/Mac</i>	<i>DOS</i>	<i>DOS/Mac</i>
<i>Toner Cart. Life</i>	<i>15K pages</i>	<i>6K pages</i>	<i>6K pages</i>
<i>Paper Trays</i>	<i>250 sheet/ 250 sheet</i>	<i>250 sheet/ 100 sheet</i>	<i>250 sheet/ 100 sheet</i>
<i>Auto Language Switching</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>
<i>Auto Interface Switching</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>40MHz Processor Upgrade</i>	<i>Optional</i>	<i>Not Avail.</i>	<i>Not Avail.</i>
<i>List Price</i>	<i>\$1599*</i>	<i>\$1839</i>	<i>\$2479</i>

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■ Microsoft Visual Basic, Applications Edition

by Sheryl Canter

As we went to press, the Microsoft Excel, Version 5.0, spreadsheet package was being readied for release. Incorporated within the new Excel is the first incarnation of Microsoft's common macro language, Visual Basic, Applications Edition (VBA). As a full-featured programming language that supports OLE 2.0 automation, VBA claims to go far beyond what is typically provided in application macro languages, opening the way for serious programming. We put a late beta release of VBA through our full test script to evaluate that claim.

POWERFUL BUT NOT VISUAL

Visual Basic, Applications Edition, derives its name from the dialect of BASIC it uses, not from the visual design tools found in Visual Basic, Version 3.0. In fact, the interface design tools included in Excel 5.0 are part of Excel rather than VBA and operate quite differently than those in standalone Visual Basic. Also, although VBA and Visual Basic use a similar syntax, you can't import standalone Visual Basic code into VBA.

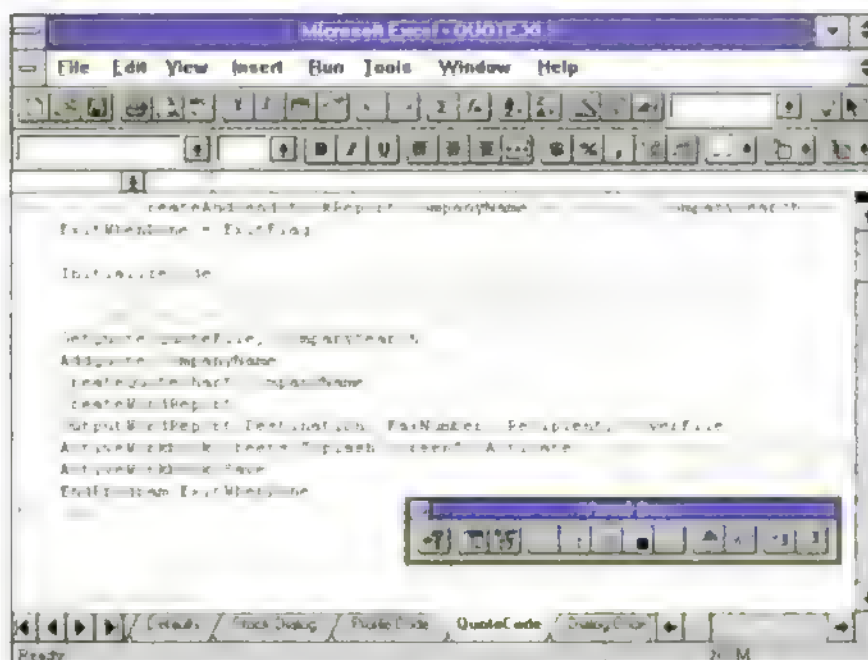
But VBA's support for OLE 2.0 and DDE, as well as its ability to send keystrokes, makes it very well suited for application-integration projects. Though it took a lot of coding, VBA was able to implement our test script in its entirety.

We used the newly released Microsoft Word for Windows, Version 6.0, in our test script. Word 6.0 has one exposed OLE 2.0 object: Word Basic. Using VBA, we were able to embed a Word Basic macro within our VBA program. For the fax software component we used Delrina's WinFax Pro, which VBA controlled through DDE. The communications software WinCIM was controlled by sending keystrokes.

One weakness of VBA as an integration tool is that the Shell function, which is used to launch applications, is

asynchronous—that is, the launched app may not have completed when the next statements in your program are executed. Furthermore, there is no easy way to tell when the launched app completes. This is a problem when the next task depends on the previous one having finished.

The interface designer, which is



The VBA code editor uses color syntax highlighting. A floating toolbar lets you step through your code.

part of Excel and not of VBA, is restricted to simple dialog boxes. While it's a big leap beyond Excel 4.0 macros, users expecting something more akin to the standalone Visual Basic interface builder will be disappointed. Only one predefined event is associated with each control, and there are no Property Sheets.

Excel 5.0 offers a small toolbox with interface objects that work much like the standalone version of Visual Basic, but you can't expand the Toolbox with standalone Visual Basic controls, as they are incompatible. Also, code is attached differently. Rather than double-clicking on the object to bring up the edit window, you right-click and then choose the Assign Macro option.

LANGUAGE POWER

VBA contains a number of language enhancements. You can now create arrays of *variant* data types, which means that you can create arrays of

heterogeneous objects. Also, the new FOR...EACH...NEXT syntax lets you iterate over a collection such as an array without having to specify its upper and lower bounds. The new WITH keyword lets you assume the same object for a group of properties so you don't have to keep typing in the object name.

OLE automation is also made easier via the new Object Browser, which lets you scan through the exposed objects associated with Excel, VBA, and your current worksheets. The syntax for each method, along with its required parameters, is displayed and you can paste the syntax into your code by clicking on the Paste button.

VBA sports a full-featured debugger that is very similar to the debugger in standalone Visual Basic.

You can step through your code, set breakpoints, and watch variables, and an Immediate window lets you execute commands on the fly.

The close integration between Excel and VBA provides many nice features, too. You can refer to a VBA formula in a spreadsheet cell and you can populate a field in a dialog box by highlighting a range in a spreadsheet. The Record Macro feature works for both VBA and Excel 4.0 macros, and outputs function calls rather than recorded keystrokes, making it a terrific teaching tool. If you want to know how to write something in VBA, simply record the action and the code will be generated for you.

The preliminary version of Excel 5.0 we looked at was not without its bugs. But VBA's tight integration with Excel, its powerful syntax, and its abilities as an OLE 2.0 automation tool promise Microsoft Visual Basic, Applications Edition, a strong place in the world of applications integration. □

Satisfaction (,sat·əs·fak·shən) *n.* 1, A feature previously left to chance in the purchase of a printer. *example:* When you buy a new TI printer, your **satisfaction** is **guaranteed** or call TI within 30 days and we'll take it back.



TEXAS INSTRUMENTS



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and every printer we make. And even after the 30 days, you can continue to call the 800 number for any help you may need.

For more information about the TI microMarc™, the TI microWriter™ or the new TI microLaser™ Pro 600 printers, and for the name of a dealer near you, call 1-800-527-3500. And see for yourself how TI is redefining what you should expect from an office printer.

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* Offer applies to all new TI microMarc, microWriter and microLaser Pro 600 printers, if returned in good condition. microMarc, microWriter, microLaser and "Extending Your Reach With Innovation" are trademarks of Texas Instruments. ©1993 TI.

CIRCLE 353 ON READER SERVICE CARD

Granite Software Inc.

PubTech BatchWorks, Version 2.02

BY PAUL BONNER

Granite Software's \$99.95 PubTech BatchWorks, Version 2.02, bundles a compiler and text editor with a somewhat dated version of the Windows Interface Language (WIL) used in Wilson WindowWare's WinBatch. The result is a low-cost solution for creating and distributing scripts that integrate Windows applications, albeit one with some significant functional limitations.

BatchWorks lacks many language features that have been added to WinBatch over its past few iterations, including multimedia support, network-specific functions, DDE capability, and a full-featured dialog-box editor. BatchWorks is also missing a feature like WinBatch's often-invaluable Msg-TextGet function, which retrieves the text of a message box to let the script developer anticipate and better respond to warning messages of the "Save changes before closing?" ilk.

Nevertheless, BatchWorks remains a capable tool for automating operation of Windows applications. It sports a full range of commands for launching applications (including the ability to launch an application in an iconized or hidden window), manipulating windows, sending keystrokes to applications, responding to hotkeys, and otherwise controlling the operation of other applications.

MORE COMPLETE IDE

One area in which BatchWorks outshines WinBatch is in the completeness of the provided development environment. BatchWorks includes the PubTech Text Editor, a Windows-based editor suitable for editing scripts. While it's not state-of-the-art—it's not a multiple document interface (MDI) application, so it can work with only one file at a time, and it doesn't

include a true Windows Help file—the editor does offer more than enough refinements.

Included are a macro record/playback facility, a customizable launch menu, the ability to display text using any fixed-width font, and the ability to work with files of unlimited size. Moreover, BatchWorks includes a macro-definition file that provides rapid access to command and function templates for the entire BatchWorks language when the Text Editor is used in conjunction with BatchWorks' macro processor.

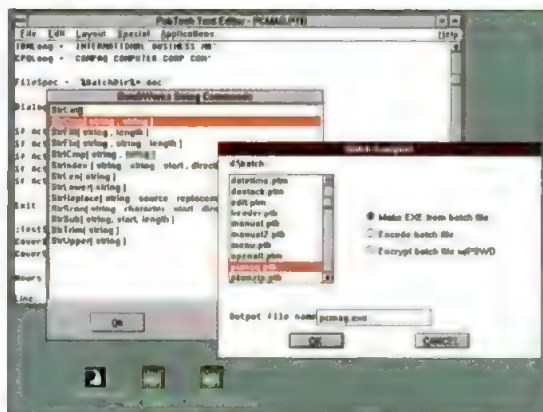
BatchWorks also provides a compiler that lets you create complete standalone .EXE files or encrypted scripts for use with a runtime library. The standalone .EXE option is somewhat misleading, since what it actually does is bind the entire runtime library to an encrypted script.

This means compiling even a one-line batch file will result in an .EXE of over 100K in size. Thus, in cases where more than one script will be distributed to the same users, it is far more efficient to

distribute the runtime library to each and simply use the compiler to encrypt the scripts. But that more efficient solution might not be the most cost-effective one: Unlike compiled .EXEs, the BatchWorks runtime library is not royalty free.

HIT YOUR TARGET WINDOW

Like WinBatch, BatchWorks can identify target windows based upon a partial win-



PubTech BatchWorks includes a text editor and a set of predefined macros that serve as function templates.

FACT FILE

PubTech BatchWorks, Version 2.02

Granite Software Inc., P.O. Box 200656,
Austin, TX 78720-0656;
800-880-1744, 512-346-2835



List price: \$99.95 (includes three-user runtime license).

Requires: 640K RAM, 1.1MB hard disk space, DOS 3.0 or later, Microsoft Windows 3.x

In short: Not cutting-edge, but priced right. PubTech Batch-

Works provides a dated version of the WinBatch language along with a compiler and text editor in a low-cost package. Many features competing packages offer—multimedia support, network-specific functions, DDE capability—are missing, but developers who need to produce standalone .EXE files and distribute them economically should find what they need.

ON READER SERVICE CARD

dow caption. Whereas most integration tools require you to provide an exact-name match for their equivalents of a FindWindow command, BatchWorks can identify the first matching window based upon a partial window name. For example, "Microsoft Word" would be sufficient for a BatchWorks script to find that window, while other packages would require you to specify the filename that Word appends to the header. Since screen titles in many Windows apps change to reflect the current open file, this ability greatly simplifies the job of the script developer, who would otherwise have to anticipate each change in a window's caption. Of course, this capability can have some unexpected results. Like a wildcard character in a file specification, commands that identify windows based upon a partial window caption can return unwanted matches if the partial caption is not sufficiently explicit.

BatchWorks also boasts a command called Diagnostic that does not appear (or is not documented) in WinBatch. The Diagnostic command provides rudimentary access to Windows' messaging functions.

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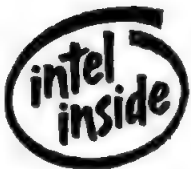
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This allows a BatchWorks script to obtain window handles for either the currently running batch process or another window, and to Send or Post messages to other windows. Many BatchWorks users might not even know of this command's existence, however, since it is documented only in a READ.ME-style text file in the BatchWorks installation directory.

BatchWorks doesn't offer a dialog editor for building dialog boxes. Instead, custom dialog boxes are created using ASCII templates. While building dialog boxes in this manner is hardly intuitive, it isn't brain surgery either. Given that you can test a dialog defined in this manner almost immediately by using the DialogBox command in a batch file, it's possible to design a simple dialog box nearly as quickly with templates as with a more interactive visual dialog box editor.

MORE THAN A LITTLE DATED

On the whole, BatchWorks strikes us as more than a little dated. The manuals are well written and complete, but there is limited on-line help, which is not in the standard Windows help format. While BatchWorks remains an effective tool for simple systems-automation tasks, overlooking the greater power and more comprehensive functionality of most of its competition is difficult.

Nevertheless, its ability to compile standalone executable files means that BatchWorks remains somewhat attractive for use in situations in which scripts need to be distributed to many users in a cost-effective manner.

Watcom International Corp.

Watcom VX-REXX, Version 1.01

BY GABRIELLE GAGNON

Watcom VX-REXX, Version 1.01, is an elegant, easy-to-use, and powerful visual programming tool for OS/2. Based on restructured extended executor (REXX), the procedural language that ships with OS/2, VX-REXX gives the venerable IBM System Application Architecture (SAA) standard a new GUI look and an event-driven lease on life.

With VX-REXX, you can create attractive graphical interfaces in a developer-friendly environment that includes a

SUITABILITY TO TASK				
Watcom VX-REXX				
	POOR	FAIR	GOOD	EXCELLENT
UI creation	●	●	●	○
Professional development	●	●	●	●
Fast application development	●	●	●	●
Distributed apps	●	●	●	●

full-featured debugger, project management aids, ergonomic design tools, and drag-and-drop code generation.

BROAD AUDIENCE

The package targets both professional developers and power users. Although Watcom International Corp. has done a nice job of shielding you from most of the complexities of GUI programming, you do need to be conversant with procedural language concepts. But if you can write spreadsheet macro programs, you'll find the language fairly easy to master, and VX-REXX's drag-and-drop programming capabilities flatten the learning curve.

Like many visual programming tools, VX-REXX is an interpreted design environment in which you build, test, and debug your application before compiling it. You construct a user interface by selecting controls from a tool palette and placing them in a window. You can position and resize objects directly with a mouse, or cut and paste them from the OS/2 clipboard. Object properties that are available during design time, such as color or tab positioning, are defined in a Workplace Shell notebook. Additional properties may be set programmatically at run-time.

You attach code to an object by selecting an event from the object's pop-up menu or notebook and then entering your code in a code block named after the event. Most window code is keyed to events. Clicking the mouse on a push button, for example, will trigger the click-event code written for that push button. You can also write general REXX routines that are not associated with any events. These can be called from window routines or can function as standalone programs.

Watcom provides a section editor that isolates each code block in a separate win-

dow. This is a handy feature since all the REXX code for a window must be stored in a single file in order for the window to share variables. Code for multiple windows may also be stored in one file.

Another nice feature is VX-REXX's drag-and-drop programming. To use it, you just open an event window, click on a program object and then drag the mouse to the event window to establish a connection. When you release the mouse button, a pop-up dialog box appears with a list of all the relevant properties and methods for that object. Select the item you want and the appropriate code is automatically written. Even default variable names are supplied. Programming can't get much simpler than that.

To keep the interface simple, Wat-



FACT FILE

Watcom VX-REXX, Version 1.01

Watcom International Corp., 415 Phillip St., Waterloo, Ontario, Canada N2L 3X2; 800-265-4555, 519-886-3700; fax, 519-747-4971

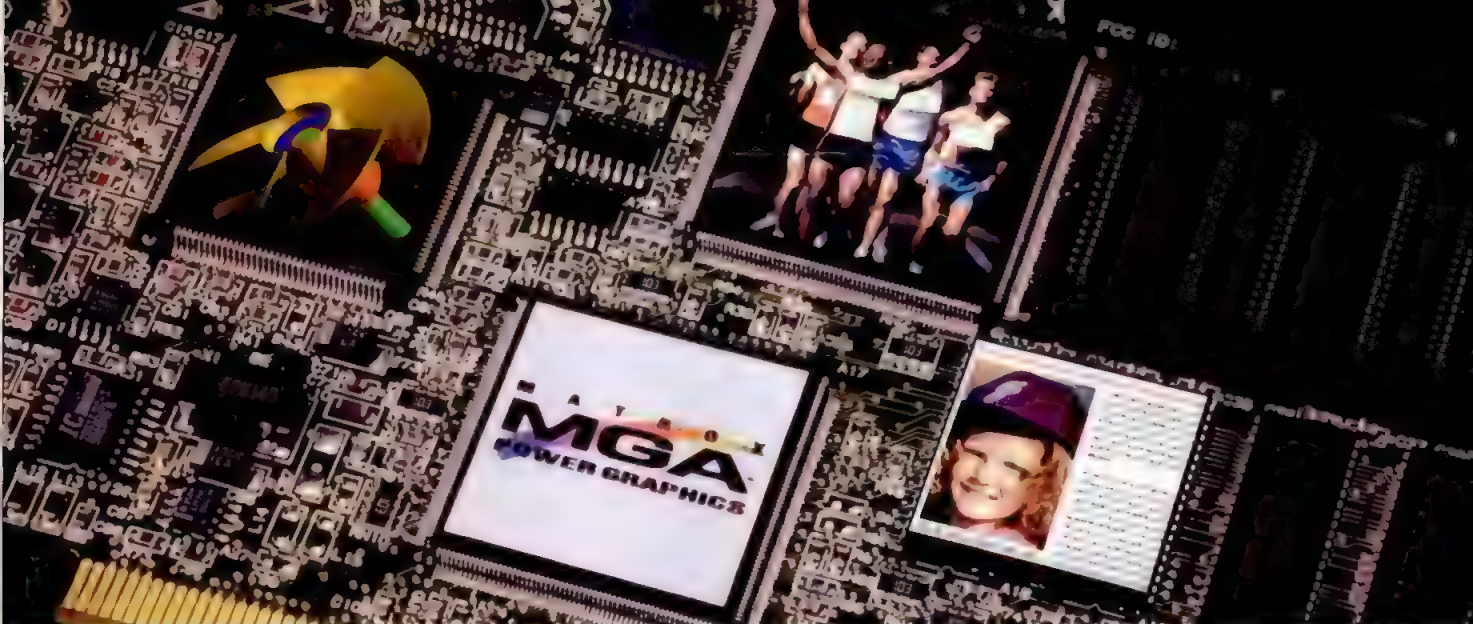
List price: \$199.

Requires: 386-based PC or better, 8MB RAM, 5MB hard disk space, OS/2 2.x with service pack and REXX installed.

In short: Think about switching to OS/2. Ideal for power users and developers alike, Watcom VX-REXX (based on the REXX procedural language that ships with OS/2) is easy to use and powerful. The drag-and-drop visual programming environment flattens the learning curve for newcomers, and the versatile language lets you tackle almost any chore. And the price is right.

472 ON READER SERVICE CARD

com supplies only a few Presentation Manager controls—including push buttons, spin buttons, radio buttons, single-line and multiline entry fields, list and combo boxes, check boxes, and picture boxes—which respond to a handful of high-level events such as click, change of value, and change of focus. Version 2.0 will have more widgets including notebook, slider, value set, container, and DDE object, and it will support drag-and-drop events. Nonetheless, the current release can deliver very sophisticated applications.



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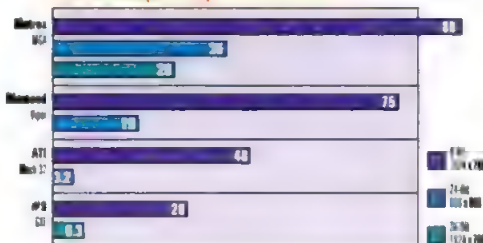
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(1) Based on in-house testing of a 2 MB MGA Ultima PCI version using Ziff-Davis WinBench 3.11. Pentium 66MHz, 512K cache, 72 Hz.

(2) Based on in-house testing of 2 MB VL boards using Ziff-Davis WinBench 3.11. Pentium 66MHz, 512K cache, 72 Hz. MGA and Number Nine's 1024 x 768 x 24-bit scores are based on 4 MB VL boards.

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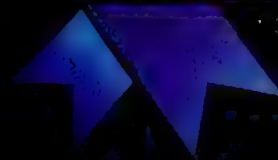
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► SUMMARY OF FEATURES

CONTINUES

Cross-Application Macro Languages

Products listed in alphabetical order

■ = YES □ = NO

List price

Development Environment

Compiler or standalone .EXE file

Dialog editor

Graphical IDE

Interpreter or runtime module

Text editor

Programming Elements

Comments

Debugging:

Breakpoints

Stepping

Watch variables

Decision making:

If-Then

Select case

Looping:

For...Next

Do...While...Wend...Until

Can call other batch files

Can call external DLL routines

User can use custom controls

Variables supported:

Arrays or compound variables

Boolean

Constants

Floating-point

Integer

Variable substitution

Programming Functions

Output:

Beep

Message and dialog boxes

MIDI or .WAV files

Modem or comm port

Printer

Input:

Comm port

Command line

Dialog box

Message box

Math:

Financial

Minimum and maximum

Random

Trigonometric

String

Case conversion (uppercase and lowercase)

Parse strings

Position (Instr)

Search and replace

Sorting

String length and string compares

Trim and pad

File management:

Open and close

Random file access

Sequential file access

Sorting

Bridge Toolkit
for Windows

\$695.00

PC MAGAZINE
EDITORS' CHOICEThe Norton
Desktop
for Windows

\$179.00

ProdeaSynergy

\$495.00

PubTech
BatchWorks

\$99.95

PC MAGAZINE
EDITORS' CHOICEWatcom
VX-REXX

\$199.00

WinBatch

\$69.95
(compiler, \$395.00)

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Optional

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N/A—Not applicable. The product does not have this feature but offers a different strategy for performing a comparable function

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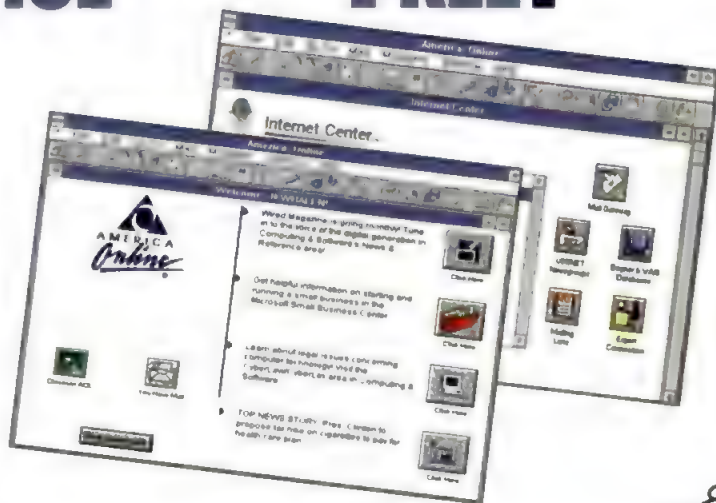
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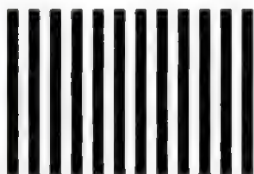


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Windows*: ☐ 5.25 ☐ 3.5

DOS: ☐ 5.25 ☐ 3.5 ☐ High Density ☐ Low Density

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SUMMARY OF FEATURES

ENDS

Products listed in alphabetical order

■ = YES □ = NO

Programming Functions (continued)

	Bridge Toolkit for Windows	The Norton Desktop for Windows	ProdenSynergy	PubTech BatchWorks	Watcom VX-REXX	WinBatch
File utilities						
Copy and move file	■	■	N/A	■	■	■
Delete and rename file	■	■	N/A	■	■	■
Edit .INI files	■	■	N/A	■	■	■
File archiving and unarchiving	□	□	N/A	□	□	□
List files	■	■	N/A	■	■	■
Read and modify attributes	■	■	N/A	□	■	■
Touch (alter date and time)	■	■	N/A	■	■	■
View files	□	■	N/A	□	■	■
Directory functions						
Change and rename directory	■	■	N/A	■	■	■
Create and delete directory	■	■	N/A	■	■	■
Directory tree	■	□	N/A	■	■	□
Find file	□	□	N/A	□	■	□
Get and set current directory	■	■	N/A	■	■	■
Indicate free hard disk space	■	■	N/A	■	■	■
List directory	■	■	N/A	■	■	■
List on-line drives	■	■	N/A	■	■	■
Perform XCOPY	□	□	N/A	□	■	□

Windows Functions

Identify/run a Windows application	■ ■	■ ■	□ ■	■ ■	■ ■	■ ■
Append text to Clipboard	■	■	N/A	■	□	■
Edit Clipboard and read .CLP files	□	□	N/A	□	□	□
Write to and read from Clipboard	■	■	N/A	■	■	■
Windows management						
Control window (show, hide, iconize)	■	■	N/A	■	■	■
Display images	■	□	N/A	□	■	□
Get and set active window(s)	■	■	N/A	■	■	■
Get and set locations	■	■	N/A	■	■	■
Get and set Windows parameters	□	□	N/A	■	■	□
Get hWnd	□	■	N/A	□	■	■
Get window name/resources	■ ■	■ ■	N/A	■ □	■ ■	■ ■
Get window state	■	■	N/A	■	■	■
Group creation	■	□	N/A	□	■	□
Open and close window	■	■	N/A	■	■	■

System-Control Functions

Access DOS environment	■	■	N/A	□	■	■
Get DOS and Windows version numbers	■	□	N/A	■	■	■
Exit Windows sessions	■	■	N/A	■	■	■
Get date and time	■	■	N/A	■	■	■
Ignore hardware input	■	□	N/A	■	■	■
Pause	■	■	N/A	■	■	■
Time functions and execution	■	■	N/A	■	■	■
Yield and take CPU control	□	■	N/A	■	■	■

Interapplication Communication

Can act as OLE client and server	□	□	□	□	□	□
DDE support	■	■	■	□	■	■
Edit recorded events and macros	■	■	□	■	□	■
Records keystrokes/mouse activity	■ □	■ ■	□ □	■ □	□ □	■ ■
Record menu and dialog choices	□	■	□	□	□	□
Send keystrokes	■	■	□	■	■	■
Send menu and dialog choices	□	■	□	□	■	□

Networking

Get user name	□	■	N/A	□	■	■
Log on and off	□	■	N/A	□	■	■
Mount volumes and drives	□	■	N/A	□	■	■
Read from and write to network files	■	■	N/A	■	■	■
Share and lock files	□	□	N/A	□	■	□

Support and Documentation

On-line forum	■	■	■	■	■	■
On-line help in IDE or editor	■	■	■	□	■	■
Examples, demos, or samples provided	■	■	■	■	■	■
Free technical support	■	■	□	■	■	■
Toll-free number	■	□	□	■	■	□

N/A—Not applicable. The product does not have this feature but offers a different strategy for performing a comparable function.

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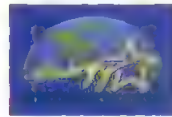
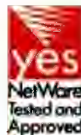
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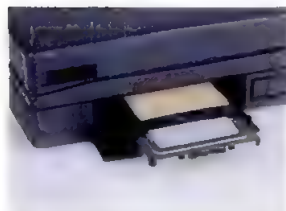
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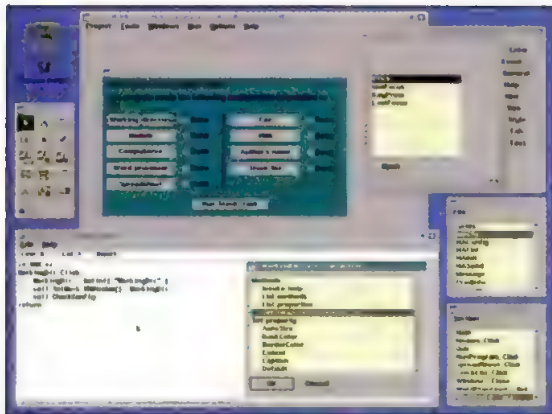
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Cross-Application Macro Languages



VX-REXX's rich IDE lets you build an interface, attach event-driven code, and then test, debug, run, and compile your app.

PROFESSIONAL POWER

Professionals will appreciate VX-REXX's error-trapping and debugging facilities. The runtime exception handler has a trace-back field that shows not only the instruction that produced the error, but the sequence of instructions that led up to it. The interactive debugging module has all the standard debugging aids and uses separate windows for displaying source code, variables, and results. Unfortunately, one feature it lacks is the ability to follow multiple threads. You can add statements to your code, however, that will allow you to trace through different threads if necessary.

After testing and debugging the application, you can compile the source code into an executable file or leave it as it is and run it through OS/2's REXX interpreter. The latter option is useful for developers who want to debug nonvisual REXX code or move it to other platforms. A runtime DLL is supplied for applications that use VX-REXX's GUI elements.

Professionals will also like the way VX-REXX integrates with other toolkits and OS/2 resources. For example, Help may be loaded from ordinary text files or you can use OS/2's Information Presentation Facility (IPF) compiler to produce hyperlinked Help instead. You can add your own System Object Model (SOM) objects or REXX extensions to the environment as well.

The ability to work with preexisting REXX code is one of VX-REXX's special strengths. REXX has an installed base of several million users, so Watcom

was careful to ensure that VX-REXX could accommodate any Presentation Manager-based REXX application along with any extensions to REXX that conform to the REXX API. Consequently, VX-REXX can add GUI interfaces to legacy applications using IBM DB/2, IBM Communications Manager, and TCP/IP REXX extensions as well as the myriad of extensions offered by freeware and shareware vendors.

Probably one of VX-REXX's most versatile features is its ability to interface with OS/2 applications that are "REXX-aware." REXX-aware applications are programs that can register their environment with REXX, making their resources available to other REXX-aware applications. Since macro writing was REXX's original purpose, many OS/2 packages have adopted it. Ami Pro, for example, offers REXX as an alternative to its own proprietary macro language. Because of the way these REXX-aware programs are able to communicate, you can use VX-REXX to create visual macros for any REXX-aware application software.

We didn't test VX-REXX's ability to write application-specific macros, since that was not part of our test script. And VX-REXX was able to complete the testing suite with ease. The applications we used in testing were all REXX-aware, but VX-REXX can communicate with unaware applications as well. It can function as a DDE client or server, or when DDE is not possible, it can send keystrokes to a target application. VX-REXX can't capture keystrokes, however, so you would have to record them manually or read them from a file.

VX-REXX is very well documented, although as we went to press the printed manuals were not entirely up-to-date. The programmer's guide and reference manuals are provided on-line as well as in hard copy. In addition to being more current,

the on-line version is better indexed and makes full use of OS/2's IPF hypertext help system. By the time you read this, a new set of manuals should be available.

All in all, VX-REXX stands out for ease of use, versatility, and power. And at \$199, including free tech support and free application distribution, it's also a sensational value.

Wilson WindowWare Inc.

WinBatch, Version 4.0

BY BARRY SIMON

Wilson WindowWare's WinBatch, Version 4.0, available in a full-fledged compiler version (\$395) or in an interpreted-only shareware version (\$69.95), is a scripting tool that packs considerable power. For some, its lack of higher-order language structures like explicit For loops and its dependence on keystrokes rather than on direct menu or dialog manipulations will limit its attractiveness. But WinBatch's tools let you accomplish a wide

range of scripting tasks, albeit with occasional awkwardness. Free distribution of executables is a plus.

THE LANGUAGE

WinBatch's homegrown Windows Interface Language (WIL) offers a reasonably intuitive and easily learned syntax. WIL uses untyped variables and offers a powerful variable-substitution feature. Programmers will notice that control structures are limited to If-Then, Else, and Goto, although more complex structures can be made from these primitives.

WinBatch has no explicit arrays but it has two replacements that serve the same purpose and sometimes provide more flexibility or power. You can create array-like elements using strings treated as lists with a delimiter, usually either a space or a tab. There are several powerful functions built into the language for manipulating such strings including ItemSort, ItemCount, and ItemInsert.

You can also use replaceable string variables. For example, if you have a

SUITABILITY TO TASK				
WinBatch				
	POOR	FAIR	GOOD	EXCELLENT
UI creation	●	●	●	○
Professional development	●	●	○	○
Fast application development	●	●	○	○
Distributed apps	●	●	●	○



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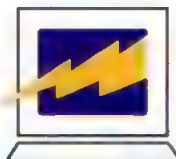
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KEYSTROKES AND THEIR LIMITATIONS

There are basically two ways in which a batch language can communicate with an application that doesn't support DDE or OLE: It can send keystrokes and mouse events or it can send messages to the application that directly invoke menu commands, fill in dialog boxes, or both. Unlike some of its competitors, WinBatch only supports the keystroke mode.

This strategy offers some advantages of simplicity. Languages that directly invoke a dialog need the internal ID used for the dialog, something that usually requires you to access the dialog with a macro-record function rather than by simply writing code. But WinBatch's keystroke orientation creates a rigidity that can cause problems if the host system changes in subtle ways. This is well illustrated by two problems we hit during testing.

In a File Open dialog used in our test script, WinBatch had to enter a filename as well as check some boxes. To maneuver to the boxes, the test script sent repeated Tab keys to the application. When we moved the script from a networked to a standalone machine, the File-Open dialog came up without a Network button,

Home followed by a specific number of down arrows, adding or removing an unrelated printer driver earlier in the alphabetic listing will cause the wrong driver to be selected. Such glitches can have serious implications if scripts are being distributed across a range of nonidentical systems.

SPARTAN ENVIRONMENT

WinBatch does not offer an integrated development environment (IDE) although Wilson WindowWare offers a separate shareware editor. WinBatch scripts can be created in any convenient text editor—Notepad, for example. Script files are saved with a .WBT extension and run like any Windows file with a known association. This separation of edit and run modes offers less convenience than packages sporting an IDE.

WinBatch provides a single-step debug mode that can be enabled with a script command. Debug provides a window that lists the previously executed command and the command that is about to execute. A Show Variable field lets you examine the current value of any variables that you type in.

WinBatch includes a visual dialog editor that allows you to generate the involved source code needed to create a user-defined dialog box. This tool lets you create, alter, and move individual controls to meet your requirements. Another companion program called WinMacro lets you attach scripts to hotkeys or make the scripts available from the control menus of other Windows applications. It can also record keystrokes for playback or use in scripts.

The \$395 compiler version of WinBatch lets you compile scripts to standalone executables that can be freely distributed. With the interpreted version, a separate copy must be licensed for every PC running scripts (both versions include documentation and free tech support).

Despite its constraints, WinBatch deserves consideration for many tasks. The shareware version offers an attractive try-before-you-buy option. □

FACT IIII

WinBatch, Version 4.0

Wilson WindowWare, 2701 California Ave,
SW, #212, Seattle, WA 98116; 800-762-8383,
206-938-1740; fax, 206-935-7129



List price: \$69.95.

Requires: 640K RAM, 1MB hard disk space, Windows 3.x.

In short: Limited, but quite usable for some tasks. On the plus side, WinBatch provides lots of commands for controlling other programs and some flexible ways to manipulate array-like structures. Its base language, however, only supports If-Then and GoTo statements, and the package only sends keystrokes, not menu choices or dialog settings. The \$395 compiler version allows free distribution of executables.



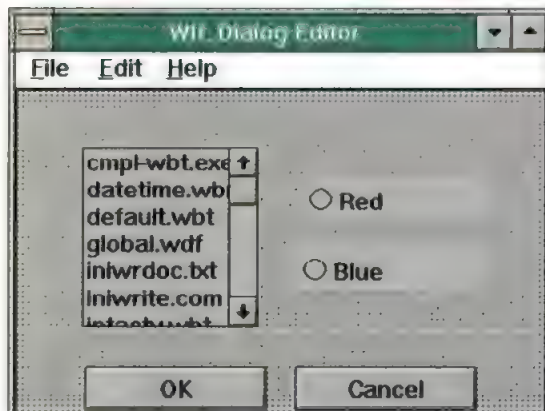
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variable called *foo*, an appearance of %foo% in a script causes the current value of *foo* to be inserted. This lets you work with variable labels (as in Goto %foo%) and even variable commands (as in foo = "DirChange('C:\')"). You can use this feature to implement an array substitute; for example, you could have variables *array1*, *array2*, ..., *array9*, *to* and a variable *j* which you gave the values 1, 2, ..., 9 in a loop using *j=j+1*. Then, you could use *array%j%* to access *array1*, ..., *array9*.

WINDOWS FEATURES

WinBatch comes with a slew of functions for controlling Windows applications and the Windows environment itself. For example, WinItemize() returns a tab-delimited list of all top-level windows that are running. There are also functions to move, resize, show, hide, minimize, and maximize windows. And you need only specify a partial window caption, so you don't need to worry about getting the name exact with programs that place the open file name in the caption.

WinBatch also boasts strong support for sound under Windows. Message boxes brought up with the Message command automatically play the appropriate sound event and you can use additional functions such as PlayMedia, PlayMidi, and



WinBatch's Dialog Editor lets you graphically create custom dialogs and then generates appropriate WIL code for your script.

forcing us to edit manually the number of tabs required to select the target box.

Our script also required WinBatch to select a fax device from the list of installed printer drivers. Since WinBatch manages this by invoking Control Panel and using

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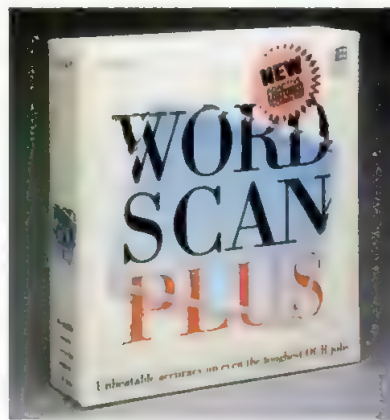
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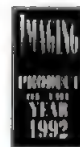
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In *Living* Color

by Daniel Grotta

A few years ago, working with 24-bit color—also known as true or photo-realistic color—was well beyond the needs and pocketbooks of most PC users. It required a fast CPU, lots of RAM, an expensive graphics board, a large high-resolution monitor, and a desktop color printer whose price tag alone surpassed that of many midsize cars. The handful of 24-bit color flatbed scanners on the market were expensive and limited in capability, and they required considerable skill and patience to operate properly.

Microsoft Windows and the graphical interface changed all that, especially Windows 3.1's 24-bit-color native graphical mode. Today it's possible to buy a 24-bit color graphics card for \$100 to \$200 and a 17-inch color monitor for under \$1,000. Thermal dye transfer printers like the Fargo Primera Color Printer and HP DeskJet 1200C/PS sell for not much more than a medium-resolution desktop laser printer.

Similarly, a profusion of powerful and relatively easy-to-use

Today's color desktop scanners are better, more affordable, and easier to use. If you need to scan a rainbow of colors, one of these 24-bit-color desktop scanners may be your pot of gold.

true-color Windows editing and publishing programs—such as Adobe Photoshop for Windows and QuarkXPress for Windows have appeared. And true-color desktop scanners have become better, less expensive, more versatile, and easier to operate.

Another major development in desktop scanning has been the widespread acceptance of the Twain applications interface standard. (According to the Twain committee, Twain is not an acronym; it represents the union of applications and input devices.)

Twain is a software interface that eliminates the need for every scanner manufacturer to write its own drivers. Rather, by automatically installing as a subprogram, Twain permits a user to scan directly into an application, such as Adobe Photoshop for Windows or Aldus PhotoStyler.

OUR TESTS

In this roundup, we tested 21 color scanners from 14 different vendors. The scanners were priced from \$799 to \$4,995. Eligible for inclusion in the review was any PC-compatible, 24-bit color desktop flatbed scanner that has a Twain driver, a minimum optical resolution of 300 dots per inch, and a price no higher than \$5,000.

When comparing the reviewed scanners, note that many of the units offer different bundles of hardware and software—for instance, image-editing programs, optical character recognition (OCR) programs, automatic document feeders, and transparency-scanning attachments (see the Summary of Features table for more information). Some scanners ship with one or more of these features, while other units offer them as options.

The price/performance ratio of software programs and features also varies. For example, the \$4,995 Spark Spectrum Scan III has transparency scanning built-in, while this is a \$1,000 option on the \$3,950 Agfa Arcus Plus. Similarly, among the lower-price models, the XRS

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OmniMedia 12c (\$2,295 with the full version of Adobe Photoshop 2.5) comes with a built-in transparency feature, while this option costs \$759 for the HP ScanJet IIcx (\$1,179 without Photoshop) and \$700 for the Microtek ScanMaker IISP, which has a street price of about \$900.

Nearly all the scanners we reviewed come bundled with an image-editing package, such as Photoshop or PhotoStyler. These applications, which as stand-alone packages cost several hundred dollars each, may be included with the scanner as part of the purchase price.

Likewise, a variety of OCR programs are bundled with different scanners.

All the tested color scanners can be used as gray-scale scanners for OCR. *Gray scale* refers to the different levels of contrast and brightness, or gray, that a scanner can distinguish (most 24-bit color scanners can distinguish 256 levels of gray).

Three years ago there was a significant price difference between 24-bit color scanners and gray-scale scanners. When the price differential shrank to the \$100-to-\$200 range, a number of manufacturers discontinued their gray-scale lines. Today a user who primarily wants a gray-scale

scanner (for line art or OCR) can have the added benefits of color for a small extra cost.

For OCR use, desirable features are fineness of optical resolution, quick scanning, and an automatic document feeder, as well as a top-flight OCR package. The HP ScanJet IIcx, one of our Editors' Choices, has an AccuPage feature that assists OCR software in recognizing text and retaining page formats.

Our focus in this roundup was on color scanning, which mainly involves graphics, so we did not test the scanners' OCR capabilities. We will review OCR applications in an upcoming story.

Even though many have fallen out, gray-scale scanners continue to drop in price. Microtek Lab recently fielded its new ScanMaker IIG with a \$499 street price, which should drive other vendors' prices down. Logitech has introduced its ScanMan PowerPage (\$799), a sheet-fed gray-scale scanner with OCR and fax capabilities that also doubles as a handheld scanner. Hewlett-Packard Co.'s gray-scale entry is the \$879 HP ScanJet IIP.

RESOLUTION

A key measure of a scanner's capabilities is its resolution, of which there are two types—optical and interpolated. The optical resolution is the "true" resolution of the scanner's optical components.

*In the past,
24-bit-color scanners
were expensive,
limited in capability, and
difficult to use.*

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Interpolated resolution is achieved by adding pixels to an image by using software algorithms (which interpolate the color values of existing pixels and fill in the spaces between them). Thus the quality of the interpolated image depends on the quality of the algorithm.

Scanner resolution is typically described in dots per inch (dpi) and lines per inch (lpi). Although it is generally assumed that scanning an image at a higher resolution (more dots per inch) produces superior results, this is not necessarily true. The quality of many images is not noticeably improved when they are scanned and printed at higher resolutions. A higher resolution also yields a larger file size. An image resolved at 300 dpi that creates a 5MB file could tie up 20MB of hard disk space if scanned at 600 dpi.

COMPUTERS AND COLORS

Why the fuss over 24-bit color? Because it's the closest computers can get to the range of colors found in nature and discernible by the human eye (and reproducible with current printing technologies).

One-, 2-, and 4-bit scanners—flatbed, hand-held, or sheet-fed—are useful only for scanning black-and-white line drawings, simple clip art, and (depending on the resolution of the device) printed text that can be manipulated by a word processing program (via OCR software).

In addition to OCR capability, which is something that any scanner with a suitable resolution of at least 400 dpi and appropriate software can perform, 8-bit scanners are suited primarily for black-and-white halftone images and color prints, or pictures that don't require accurate color fidelity.

Sixteen-bit color flatbed scanners are adequate for scanning most color drawings, illustrations, and halftone prints. But they do a poor job on color photographs or other continuous-tone originals, partly because of their limited color palette and mostly because 16-bit scanners have a very narrow gray-scale range.

Only 24-bit devices have a palette with the depth and subtlety to scan color photographs or sophisticated continuous-tone illustrations or artwork. All 24-bit color scanners also are capable of scan-

EDITORS' CHOICE

- **HP ScanJet IIcx**
- **Microtek ScanMaker IISP**

The HP ScanJet IIcx and Microtek ScanMaker IISP are our Editors' Choice winners. Both units had the best price/performance ratio of the 21 scanners we tested. Also, our jury deemed the ScanJet IIcx and ScanMaker IISP's color output the best of this

roundup, and both scanners earned outstanding scores on our test suite.

The ScanJet IIcx (with a \$1,179 list price) and the ScanMaker IISP (with a \$900 street price) are also great bargains, outperforming other scanners in this roundup that cost two to four times as much.

Hewlett-Packard Co. has developed a reputation for solid engineering and construction, and the ScanJet IIcx certainly upholds this tradition. The scanner's image quality and price are better than that of its recently discontinued predecessor, the HP ScanJet IIc, (an Editors' Choice in our last scanner review); the ScanJet IIcx was also the fastest scanner we tested. It comes bundled with a feature-rich Twain driver and Aldus PhotoStyler for Windows SE.

The ScanMaker IISP, which was introduced during our testing period, caught us by surprise with its strong performance on our tests. The scanner's quality color output is balanced by excellent software—a feature-rich Twain driver, Adobe Photoshop for Windows 2.5, and a new color-calibration system—all at a low \$900

street price. The ScanMaker IISP was also among the fastest scanners we tested.

In terms of their price/performance ratio, the ScanJet IIcx and ScanMaker IISP clearly occupied the top tier of scanners in this roundup. After these two units, a second and third tier of performers was discernible because of their output quality. Several of these scanners distinguished themselves in particular categories—speed, line art, gray scale, or resolution (see the individual reviews for more information).

The Envisions ENV6100, which lists for a low \$799, is a good buy for the price, but we did not find it to be a better value than our Editors' Choice winners. Among the stronger performers in our roundup were the AVR 8800/CLX/Pro Image, Epson Action-Scanning System, Epson ES-800C Pro, KYE Genius ColorPage-1, and UMAX UC1200SE.

One of these color desktop scanners will likely meet the needs of most PC users who want to add photos, drawings, and text to reports, newsletters, and presentations.

ning in black-and-white line graphics and text, as well as gray-scale images. As more users get into desktop publishing, digital imaging, and even prepress and other graphics-intensive professional applications, 24-bit scanning capabilities become essential.

NEW LOOK

In our last review of 24-bit scanners ("True-Color Performance at Gray-Scale Prices: Nine Desktop Scanners That Do It

All," April 14, 1992), the average list price of the nine devices we tested was about \$2,100. Three of the scanners had a maximum resolution of 300 by 600 dpi, one was rated at 400 dpi, and the rest offered 300 dpi. Interpolation was available only from a few.

Of our criteria in judging the relative merits of one scanner against another, we were particularly interested in such things as a scanner's speed, if it had an HP ScanJet emulation, if it were a one-pass or

three-pass unit, what editing features the drivers offered, if an automatic document feeder were available, and the optimum scan quality it could produce.

While most of those above-mentioned criteria are still important to buyers, we focused on some new aspects in assessing this year's crop of 24-bit scanners. Besides Twain compliance, we looked at a scanner's interpolation software and how interpolated scans compared with optical-resolution scans; its accuracy when rendering flesh tones, line drawings, and images with lots of details in shadow and light; and the severity of moiré patterns when scanning halftone material at high resolutions.

Today's scanners are better than ever. They are faster at scanning originals at full 24-bit color and offer higher resolutions. While most scanners in our last review had a 300-dpi resolution, most of the units in this story have a 400-dpi resolution. In addition, each scanner can boost the basic optical resolution by a factor from 1.5 to 4 through interpolation. Some models offer interpolated resolutions of 800, 1,200, and 2,400 dpi. Those numbers begin to approach service-bureau scan territory.

TWAIN

Scanning today is a far easier proposition, thanks to Twain, which serves as a common protocol for flatbed scanners, film scanners, and other input devices. From being virtually unheard of two years ago, Twain has quickly become a near-universal standard.

Two years ago, each scanner manufacturer had to provide its own proprietary scanning software or drivers. You would first run the program, make whatever prescan adjustments or corrections were available, scan the image, save the file, and close the program. Then you would load Aldus PageMaker, Micrografx's Picture Publisher, or some other application, and then call up the scan file. This multistep procedure was tedious and time-consuming, and occasionally software conflicts or file incompatibilities made it impossible to use the scan files with your favorite desktop publishing or paint program.

Because you can now activate your scanner from within your applications program, thereby eliminating the need for a separate scan program, the question of

whether or not a scanner is HP ScanJet-compatible has become irrelevant.

Not all Twain drivers are created equal, however. A bare-bones Twain driver provides basic prescan and scan capabilities, but lacks tools for fine-tuning images (and most images need improving for an optimum scan). Vendors add value to their drivers by providing tools that help a user more easily improve an image. For instance, some programs provide tools that assist the user in selecting the optimum resolution and color settings (RGB values, or gamma curves).

Other useful features include highlight and shadow controls, color prescanning (which can be switched on and off), and auto-adjustments for color correction and shadows. Also useful are black-point and white-point setting tools (to set absolute black and white values), prescan zoom controls, and image cropping tools (which lets users type in desired dimensions).

SCANNER INTERFACE

Today, because of the proliferation of SCSI devices (such as high-capacity SCSI

HIGHLIGHTS

Color Desktop Scanners

WE TESTED 21 COLOR DESKTOP

scanners (24-bit, or true-color) from 14 vendors. Prices ranged from \$799 to \$4,995. Ten of the scanners have prices less than \$1,300, including both Editors' Choices—the \$1,179 (list price) HP ScanJet IIcx and \$900 (street price) Microtek ScanMaker IISP. The highest-priced scanners offered the highest resolutions.

COLOR SCANNERS ARE BETTER,

more affordable, and easier to operate than earlier models. All of the scanners we tested offer an optical resolution of at least 300 by 600 dpi. Eleven of the scanners offer 400 by 800 dpi or higher, and six can do 2,400-dpi interpolated. Increasingly, scanners are providing single-pass scanning, which is faster than three-step operation. Good news for users: Along with the advent of Twain

drivers, SCSI interfaces have become standard, making scanner setup and operation easier than ever.

TWAIN DRIVERS, which provide a standard interface between peripherals and applications, have attained near-universal acceptance in the scanner arena. Through Twain, scanning is simplified: Images can be scanned directly into applications such as Adobe Photoshop for Windows. Some better-quality Twain drivers have features like controls for color correction, highlight and shadow, color prescan, cropping, and zoomable prescan.

NEARLY ALL THE SCANNERS we reviewed provide software tools that let users enhance scanned images. Since users vary in their ability to enhance images (and many do not want to), and because better results

generally are obtained from higher-quality original scans, we judged the color output quality produced by each scanner in its default setting.

COLOR OUTPUT produced by the 21 scanners in their default settings varied (see the test results and reviews). Most units produced acceptable results, but several samples were muddy and washed out. The best results, as determined by our jury, were produced by the HP ScanJet IIcx and Microtek Scanmaker IISP, our Editors' Choices.

ALL COLOR SCANNERS function as gray-scale scanners and can be used for OCR applications. Only 6 of the 21 scanners in this review ship with OCR packages. For OCR work, a fast scanner with high dpi capability, automatic document feeding, and fine optical resolution are desirable.

SO ADVANCED IT EVEN TURNS ITSELF OFF.

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September 14, 1991
Nanao FlexScan F-550W



FlexScan F-550W

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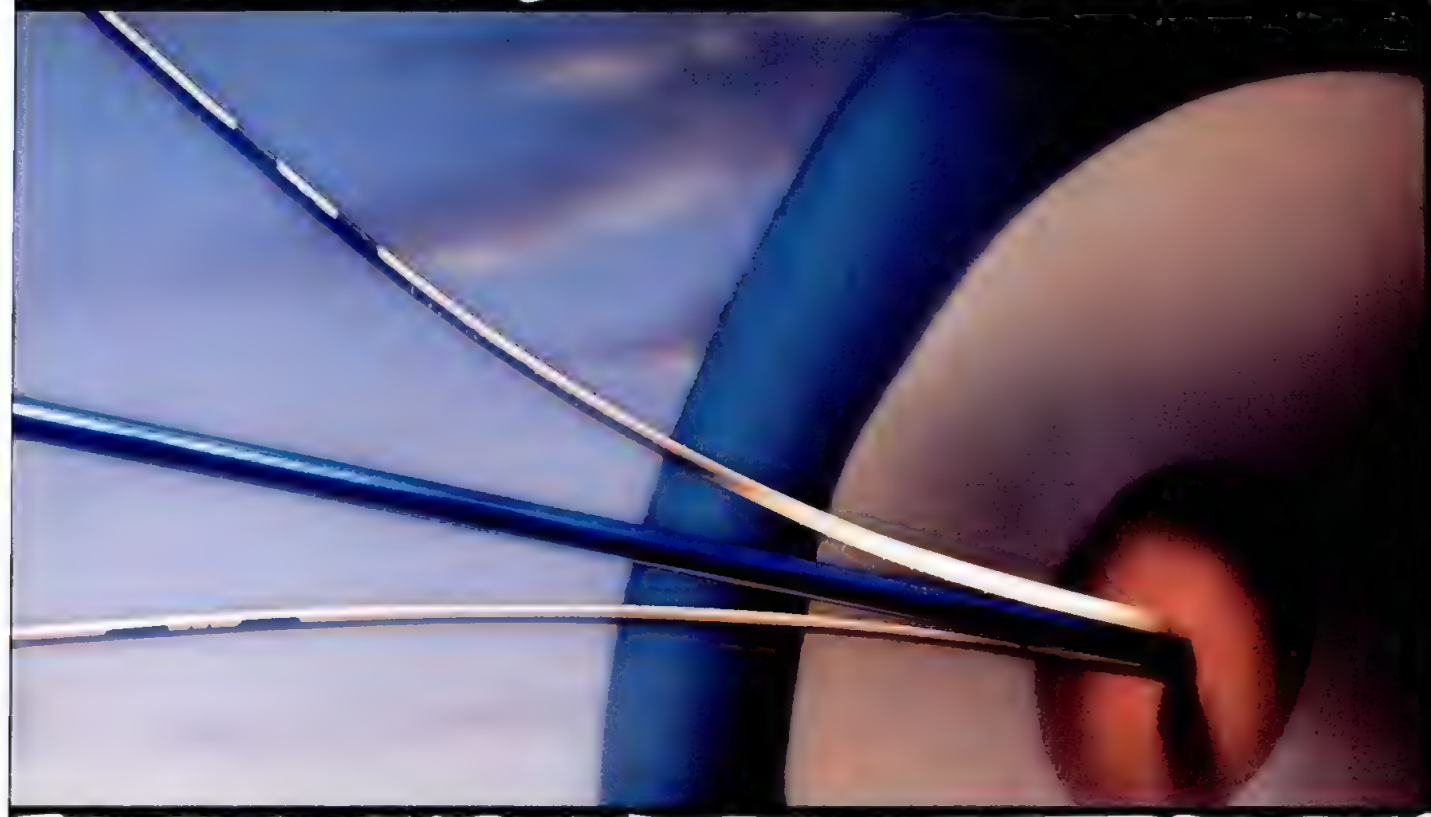
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hard disks, CD-ROM drives, SyQuest drives), many computers have SCSI boards installed. All the scanners in this review are SCSI devices. Although nearly all of them come bundled with an 8- or 16-bit SCSI board, most also use industry-standard ASPI drivers. That means that you can probably throw the bundled board away and run the scanner off your main SCSI controller.

ASPI drivers also mean you can probably install the scanner's own SCSI board in your computer and configure it so it will peacefully coexist with and work independently of your main SCSI board. In either instance, it's both simpler and faster to connect a scanner to a PC than it was 20 months ago.

SCSI interfaces can differ in the length and shielding of the SCSI cable, however. Some scanners provide a SCSI terminator plug, while on others the plug is built into

the scanner. Also, the scanner ID number must be set by flipping DIP switches on some scanners, while others let you select the ID merely by pushing a button.

SCANNING IN DEFAULT

One measure of a good scanner is how well it scans images using only its default settings. Making prescan corrections used to be so difficult that scanning was considered a black art. But most current 24-bit color scanning software provides automatic compensation for over- or underexposure, as well as for other lighting problems.

All the scanners we tested can improve images through their software tools. But because tweaking images depends as much on the operator's skills as on the scanner's mechanical makeup, we could not easily devise an objective test to determine which scanner could produce the

best possible image through manual adjustments.

With this in mind, when judging scanners we put a lot of weight on their ability to render color photos using their default settings. Specifically, we looked at how well each scanner handled skin tones and shadow areas, the overall fidelity of the colors, and the sharpness of the images (see the target samples in the sidebar "How We Tested").

Our reviewers did look at the prescan tools each manufacturer provided, and assessed their ease of use and the image quality they were able to attain. None of the units we tested was capable of reproducing completely accurate colors without prescan corrections. Most scanner software is designed to recognize and reproduce skin tones, and all the units were able to render skin tones acceptably. Shadow areas were difficult for scanners

Commercial vs. Desktop Scanners

by Daniel Grotta

Commercial-quality 30-bit or 36-bit flatbed scanners generally cost from \$20,000 to \$60,000, and a 48-bit drum scanner can run up to \$250,000.

Because of the expense of these scanners, they are found mainly in service bureaus and print shops. A single scan on this expensive high-end equipment can cost between \$35 and \$300.

Currently, there are no monitors, printers, or film recorders that can utilize the many billions of different color combinations that high-end scanners are capable of capturing. But the qualitative advantage of high-end scans over those produced by 24-bit flatbed scanners has little to do with more colors or, in many instances, even a greater resolution. It's the combination of three important technical criteria that contribute to superior scans: oversampling, gray scale, and registration.

Based on the premise that more is better, oversampling is the process of producing far more data than could possibly be used. Oversampled scans,

made with 30- to 48-bit scanners, produce higher-quality images because the excess data compensates for data dropouts (produced by electrical blips, computer glitches, or defects in the scanner hardware), minimizes artifacts

*The combination of
oversampling, gray scale,
and registration contributes
to superior scans.*

(the introduction of stray pixels that have nothing to do with the scanned original), and reduces or eliminates moiré patterns (geometric swirls that often appear when scanning halftone material).

Also, high-end scanners have more extended and accurate gray-scale capabilities than their 24-bit counterparts (especially when working with shadows and highlights). Most commercial quality scanning devices don't

use a charge-coupled device (CCD), which has a relatively limited dynamic range, instead employing a more accurate and sensitive technology called a photomultiplier tube (PMT). PMTs are better able to render continuous tones, greatly reduce or eliminate visible banding (the tendency for gradients to produce marked lines or bands when moving to a darker or lighter area), and enhance details in shadows and highlights often lost by 24-bit scanners.

A third advantage is registration. The scanner mechanisms in high-end devices (such as motors and gears) are built to much higher tolerances and with superior materials than less-expensive 24-bit scanners. For instance, instead of the stepper motors that move the scan mechanism in desktop scanners, commercial scanners use much more accurate screw or worm gears. Better mechanics combined with the PMT produce a more precise scanning track and better alignment, lessening the tendency for RGB color channels to separate. □

Color Desktop Scanners

that tended toward underexposure but were handled better by those with a bias toward overexposure.

SCANNER RESULTS

The two scanners that stood out in this review were our Editors' Choice winners: the HP ScanJet IICx and Microtek ScanMaker IISP. The ScanJet was almost 50 percent faster than its nearest competitor (the Spark Spectrum Scan III), and our jury rated it second only to the ScanMaker IISP. It also performed acceptably on our line-resolvability and gray-scale tests. The ScanMaker IISP is driven by a new scan engine that is significantly faster than the one in its older sibling, the Microtek ScanMaker II, and its output was judged the best by our jury. The ScanMaker IISP also has a new color-calibration system.

The slowest scanner in this review was

the Agfa Arcus Plus. Performance of this one-pass scanner was affected by the poor SCSI card bundled with the unit. In general, you can provide an inexpensive boost to your scanner's performance with an investment in a fast SCSI II card (if you are willing to wade through potential compatibility issues), and by keeping a supply of replacement RGB bulbs.

None of the tested units produced an observed resolution that approached its claimed maximum optical resolution. Those closest to their claimed resolutions were the Microtek ScanMaker IISP, Mustek Paragon 1200, Tamarack 8000C, and Tamarack 12000C, all of which pro-

duced observed resolutions that topped out at 284 lpi. The claimed maximum optical resolution for these units ranged from 400 lpi to 600 lpi.

In general, units that claimed a greater than 300-lpi optical resolution performed slightly better than the 300-lpi units, although the observed differences were generally much lower than claimed, and our jury's ratings were almost completely uncorrelated with either the claimed or

observed resolutions.

Although our panel felt the ScanMaker and ScanJet rendered the best images, it's interesting to note that the scanners in third and fourth place were different for each type of test picture. Clearly, some scanners were good at rendering well-exposed, well-lit pictures, while others were better when dealing with underexposed originals.

CHOOSING A SCANNER

Besides resolution, speed, features, and interface, the most important criteria for choosing a desktop color scanner are your needs and budget. You should match the unit to the size and quality of your final output requirements.

Before you consider buying a scanner, you have to analyze why you want to have it, what you will be doing with it, and most importantly how you will be using the images that you will generate with it. Generally speaking, there are two types of output for which your files may be destined—digital or prepress.

Desktop printers and film recorders are the most typical digital output devices. When you scan material that you plan to print, you should match the printer resolution as closely as possible. For example, if you use a 400-dpi color printer, you should buy a scanner with at least a 400-dpi optical resolution.

For prepress scans (material that will be sent to a printing press), the rule of thumb is that your scanned image's dots per inch should be approximately twice its intended halftone screen's lines per inch. Thus, if you have a newsletter for which

*The HP ScanJet IICx and
Microtek ScanMaker IISP,
according to our jury,
rendered the best images
of the group.*

How do you know when to use a 24-bit flatbed scanner and when to go to a service bureau for a more sophisticated scan? As a rule, you should send your images to a service bureau if

- you need top-quality work (images printed at greater than 150 lines per inch, for instance);
- your final images will be oversized (if the final output will be more than, say, three times the size of the original);
- you want to scan 35-mm or 2-inch transparencies or negatives and don't own a film scanner;
- the original artwork is too large for a desktop scanner's platen;
- the original print or drawing is not perfect and therefore needs special adjustments, such as compensation for bad exposure or poor contrast;
- you're using your 24-bit scanner for generating proofs and FPOs and want the service bureau to make color separations, do the trapping, and take responsibility for all the other technical processes involved in prepress.

Your 24-bit scanner may be perfectly adequate for all your needs if

- you don't require top-quality output (you're only outputting to a desktop color printer, reproducing on

newsprint, or printing images at less than 150 lpi);

- your final images are to be sized at 3:1 or less;
- your 35-mm slides or negatives will be printed at a size no larger than 4 by 5 inches;
- the originals to be scanned are perfectly exposed and have a limited dynamic range;
- top quality is less important than cost and convenience.

One last factor that you should consider when deciding whether to use a 24-bit scanner or a more sophisticated device is the quality of the photo or drawing to be scanned. The quality of the image can greatly affect the outcome of the scan.

While a drum scanner or 36-bit flatbed scanner can often perform magic in rescuing an otherwise unusable photo or piece of art, it can also produce too good a scan, enhancing dust, scratches, and other defects on the original that would not be visible in a 24-bit scan. It can take hours of electronic retouching (with a package like Adobe Photoshop) to clean up this debris, so depending on the condition of the original image, sometimes a scan can be too good for practical use. □

Benchmark Tests: Color Desktop Scanners

Of the 21 color desktop scanners we looked at for this review, the HP ScanJet IICx and Microtek ScanMaker IISP stood head and shoulders above the rest in terms of speed and output.

How We Tested

Our test-beds consisted of Compaq Deskpro/M PCs, each equipped with 16MB of RAM, a 335MB Conner CP-3361 hard disk, a SuperMatch 20-T XL monitor, and a Suprasmac Spectrum/24 graphics accelerator. Prior to testing, we calibrated each monitor to a gamma reading of 1.0 and a color temperature of D5500° using Suprasmac's SuperMatch monitor color calibrator. We printed scanned images on a Tektronix Phaser IISDX thermal dye transfer printer. For image acquisition, we used each manufacturer's supplied Twain driver within Adobe Photoshop for Windows 2.5. Eastman Kodak Co. provided us with an SR-37 Grayscale Reference Strip for our gray-scale test and its latest IT8-compliant revision of the Q-60 color target. Our line-art target was a PM-189 Scanner Test Target, from Century A&P. In addition to the test targets, we used several images to evaluate the scanners; these included a kindergarten class photo (to evaluate skin tones), a photo of a young girl standing in a garden (to provide contrast and color), a black-and-white photo of a group of boats on a shoreline, and several four-color offset reproductions.

We scanned a 4- by 5-inch section of the classroom photo at 300 dots per inch in 24-bit-color mode to collect data for our speed test. For each scanner, we placed the image at the upper left corner of the scannable area and scanned it three times to produce the averaged scores shown. One-pass scanners like the ScanJet IICx are significantly faster than older, three-pass models.

We used the PM-189 line-art test, which includes four targets (horizontal,

vertical, diagonal, and horizontal/vertical), to assess each scanner's observed resolution in lpi. For this test, we did not adjust the thresholds for these scans, since very few of the vendors' Twain drivers allowed direct threshold adjustments within the driver (most offer brightness and contrast controls).

We used the Kodak SR-37 strip for two different tests. First we scanned the target at 200 dpi in 24-bit color mode and used Photoshop's Histogram function to collect values for the median red, green, and blue values for each of the 37 discrete gray levels in the strip. The results were imported into a spreadsheet package and plotted. An ideal output would have resulted in identical median values for each color gun. Variations from that ideal favor one or more of the colors and are designed to make the output more pleasing visually (the HP ScanJet IICx's output shows this scanner's heavy cant toward red). As long as the cant is relatively uniform, units that favor one color over another can be manually adjusted within Photoshop. Problematic units can be identified by plots with one color curve crossing over another color curve, implying a nonlinear color trace that is not easily correctable by software.

Our second test using the Kodak SR-37 target was a gray-scale-mode scan at 200 dpi. We evaluated the displayed image and report the number of gray steps observed (the maximum is 37). The Epson ES-800C Pro produced an image with 28 observable gray-scale steps, just a few more than the UMAX UC1200SE's 26.

Our jury ratings are based on subjective evaluations of two images, scanned in 24-bit-color mode at 300 dpi and printed on the Tektronics printer. Our jury consisted of eight members of *PC Magazine's* editorial and laboratory staff. For the scanned photo of a girl with a pink ball, the jurors were asked to focus on three specific areas—the girl's face (her skin tones and detail), the pink ball (its color and highlighting), and the shadowed area to the left of the young girl (its detail and contrast)—and also give their overall impression of the scan. For the scanned photo of the classroom, jurors were asked to evaluate flesh tones, especially for the two girls seated above and to the left of the class sign; examine the amount of detail in the floor; judge the color and highlighting of the two girls' red clothing; and

Color Desktop Scanner Test Results

	Image ratings (scale of 1 to 100)		Speed (minutes: seconds)	PM-189 Scanner Test Resolution (lines per inch)				Gray-Scale (number of observed steps)
	Photo of girl with pink ball	Photo of classroom		Image A	Image B	Image C	Image D	
Agfa Arcus Plus	4.6	4.3	3:06	254	284	280	280	21
AVR 6600/CLX/Pro Image	3.6	3.2	2:15	203	183	275	275	25
AVR 6800/CLX/Pro Image	5.9	6.1	2:22	203	183	200	250	22
Computer Friends AV-660	4.1	4.0	1:40	229	183	200	250	21
DextraPage DF-1200P	3.8	4.5	1:29	203	254	300	450	18
ENV6100	2.9	4.2	1:27	203	163	250	250	16
ENV8100	3.8	4.2	1:37	254	229	280	325	21
Epson ActionScanning System	5.5	4.9	0:49	203	254	275	225	25
Epson ES-800C Pro	5.4	4.7	0:47	229	229	300	300	28
HP ScanJet IICx	7.0	7.1	0:28	254	254	290	270	25
KYE Genius ColorPage-I	5.8	5.2	1:23	203	229	300	250	21
Microtek ScanMaker II	5.5	4.6	2:03	254	254	260	280	24
Microtek ScanMaker IISP	7.5	7.2	1:31	284	254	275	300	19
Microtek ScanMaker IIXE	4.0	4.6	1:31	254	254	274	320	23
Mustek Paragon 1200	4.4	4.4	3:02	284	284	410	480	23
Spark Spectrum Scan III	4.7	4.4	0:41	254	284	310	320	23
Tamarack 8000C	5.3	6.0	2:08	284	254	280	350	18
Tamarack 12000C	3.6	4.3	2:24	284	284	300	400	25
UMAX UC1200SE	5.3	5.2	1:05	254	229	250	450	28
UMAX UC1260	4.9	4.7	1:33	254	229	400	250	17
XRS OmniMedia 12c	4.2	4.9	1:47	254	254	240	280	21

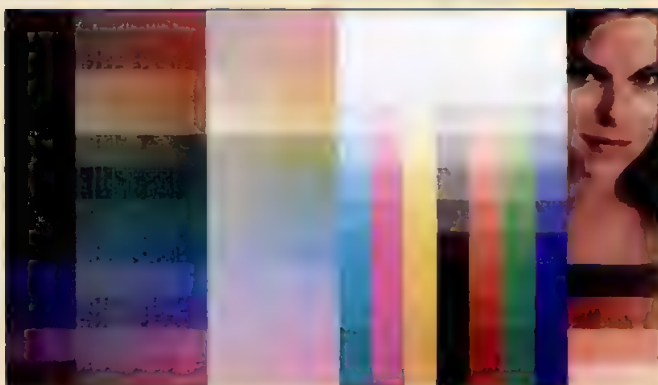
●—Larger numbers represent better performance.

●—Smaller numbers represent better performance.

provide their overall impression of the scan. We weighted and averaged the results to yield the single number we report here.

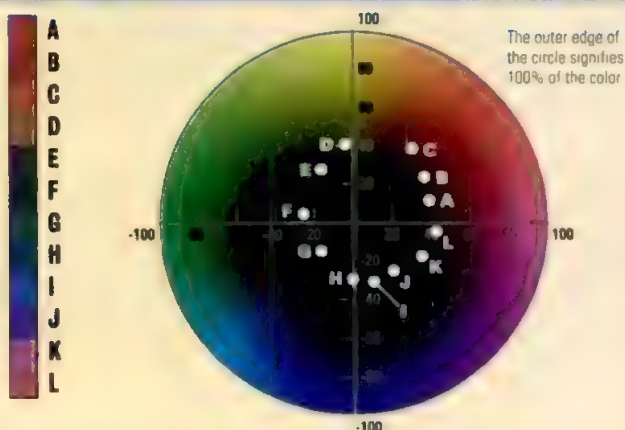
The color-gamut charts were created by scanning row B (A through L) of the Kodak IT8-compliant Q-60 target in 24-bit-color mode at 200 dpi, and using Photoshop's Histogram feature to determine the median red, green, and blue values for each color swatch. Each value was plugged into a Microsoft Excel file containing an RGB-CIE template to create the charts. In general, scanners better able to match the actual spectrophotometric values in the Q-60 target produced regularly shaped plots covering larger areas of the chart. Plots from scanners with reduced color sensitivity covered smaller areas of the chart.

Q-60 COLOR-REFERENCE TARGET



We used the Kodak IT8-compliant Q-60 Color-Reference Target to produce the color-gamut plot for each desktop scanner.

COLOR-GAMUT PLOT

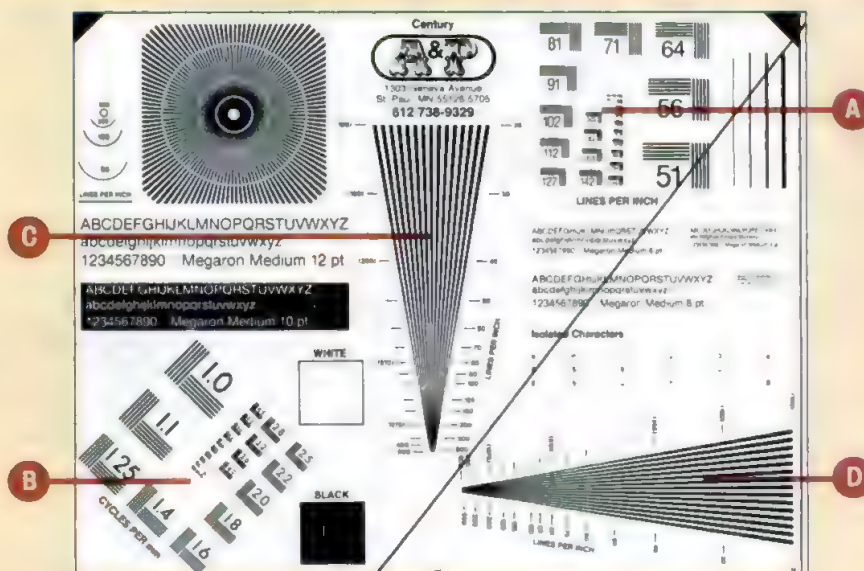


The UMAX UC1200SE produced a balanced, evenly distributed color gamut, although the range of color sensitivity it represents is fairly small. Note that each scanner's range was obtained using the Twain driver's default settings.

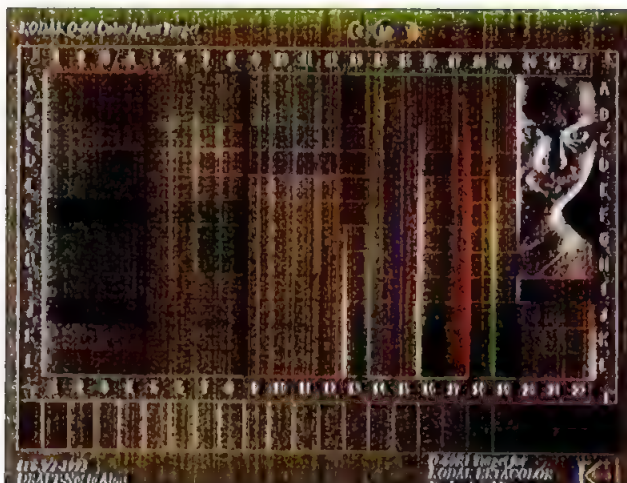
PM-189 SCANNER TEST TARGET

Images A and B are standard microcopy-resolution test patterns. The two patterns are identical, but image B is rotated 136 degrees counterclockwise from image A. The scale shown for image B is in cycles per millimeter (cpm). To simplify comparisons, we converted the cpm readings to lines per inch (lpi) in the accompanying table. We used these patterns to determine the resolution for both aligned and unaligned image patterns.

We used the Horizontal-Resolution Wedge (Image C) and Vertical-Resolution Wedge (Image D) to determine each scanner's horizontal- and vertical-resolution capabilities, respectively. Nearly all of the scanners created severe moiré patterns from these two wedges.



COLOR-REGISTRATION TEST



The HP ScanJet IIcx did very well on this test. Slight inconsistencies in its auto-threshold algorithm let some of the color blocks leak through (bear in mind that we have adjusted these images to highlight such inconsistencies), but the image is nearly noise- and

streak-free. The AVR 8800/CLX/Pro image, on the other hand, produced a streak-filled image, which indicates horizontal and vertical alignment problems. Other units that did poorly on this test were the Mustek Paragon 1200 and the Microtek ScanMaker II.

ORIGINAL TEST IMAGES



This classroom image provided each scanner with an opportunity to reproduce a wide range of skin tones and details. The photo of the girl with the pink ball contains several features that are difficult to scan: bright highlights, dark shadow areas, skin tones, and saturated colors.

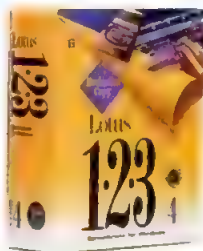


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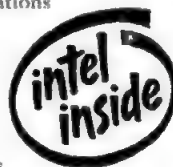
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Benchmark Tests: Color Desktop Scanners

PHOTO OF THE KINDERGARTEN CLASS

In the original image, the backdrop curtains are gray, the girl seated third from the left in the front row is wearing bright-red pants, and the woman standing to the right of the children is wearing a blue pants suit. The DextraPage DF-1200P produced an image so dark that the woman seems to be wearing a brown ensemble, the curtains look dirty, and the young girl's pants appear dark red, almost brown. The girl seated to her left appears to be wearing a black jumper, but in the original photo her outfit is green-and-red plaid. The floor is dark and has extremely little detail, and the first-row children wearing dark shoes appear footless.

The Epson ES-800C Pro produced a brown-tinged image, with wan and sickly flesh tones, but was able to reproduce some of the floor detail and a hint of plaid in the jumper.

The Microtek ScanMaker IISP handled this image fairly well. Note the shadows and details in the floor, the gray curtains, the woman's blue pants suit, and the healthy flesh tones. This scanner did change the original's reds to oranges, and some detail has been lost, but the ScanMaker IISP and HP ScanJet IICx were the only units to reproduce both the plaid jumper and the gold necklace worn by the woman.

PHOTO OF THE GIRL WITH THE PINK BALL

The top-ranked Microtek ScanMaker IISP best reproduced the photograph. Although some of the original's color and sharpness have been lost, the scanner was able to retain the detail in the shadow areas above the pink ball. The lower leaves of the hydrangea are distinct and close to the original's color.

By contrast, the bottom-tier Envisions ENV6100 produced an extraordinarily dark image. Much of the original's detail has been lost, especially in the shadow areas. The lower leaves are completely obscured, and the young girl's eyes are blackened. Also, the bright-green leaves look dark and unhealthy.

The AVR 6600/CLX/Pro Image did almost as poorly. Its scan is nearly as dark as the ENV6100's and is muddy and indistinct. The entire image leans heavily toward brown and red.

DextraPage DF-1200P

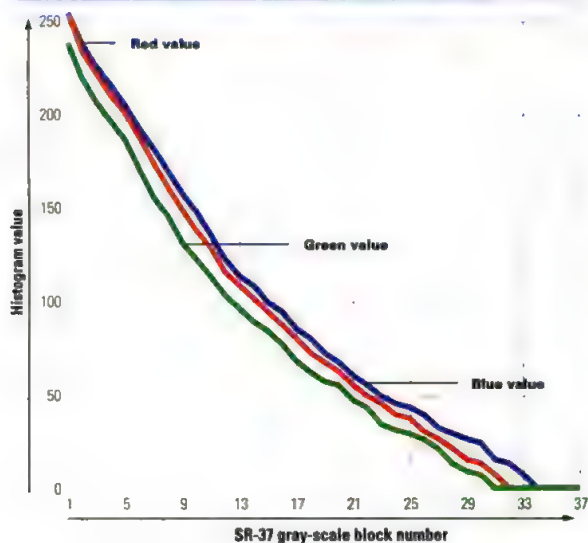


Epson ES-800C Pro

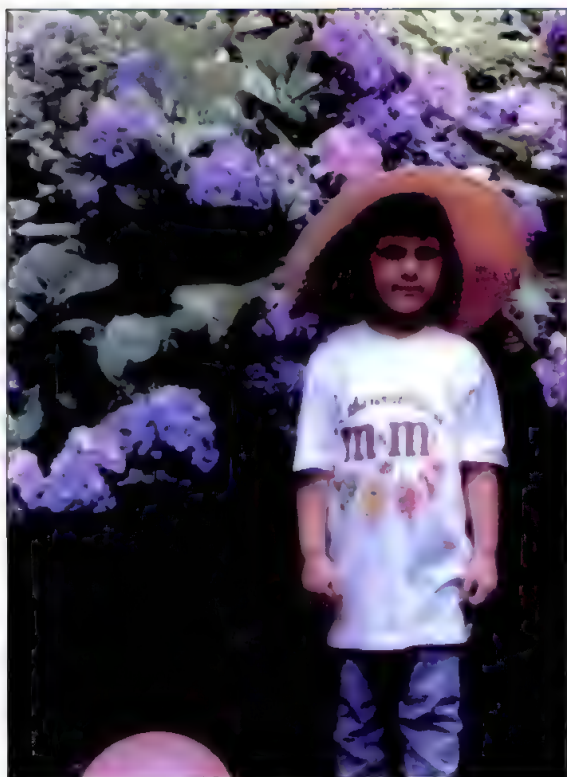


Microtek ScanMaker IISP



HP ScanJet IICx**SR-37 RGB PLOT**

The HP ScanJet IICx's output is heavily canted to the red, as evidenced by this SR-37 RGB plot. At every data point, the HP's red value is higher than its blue and green values. An ideal scanner would have produced a single smooth curve, with equal red, green, and blue values at every point.

AVR 6600/CLX/Pro Image**Envisions ENV6100****Microtek ScanMaker IISp**

GRAPHICS HARDWARE

Color Desktop Scanners

you use a 110-lpi line screen for your pictures, you should use a scanner with a resolution of at least 220 dpi.

Avoid the temptation to increase the scanner resolution well beyond your intended output resolution. One reason is that overscanning will create very large, even unmanageable files. The other is that either your desktop printer or film recorder, or the service bureau's image setter (which makes the color separations that go onto a printing press) will automatically throw out all unnecessary data when it rasterizes (preps) the final image. A prep is an expensive and extremely time-consuming process. Since service bureaus charge for the time it takes to print a file, this leaves you with little say over which pixels the computer retains and which ones it discards.

The other part of this equation is size: How large will the final image be, relative to the original scanned material? Ideally, the target photo, drawing, or illustration should be no less than one-third the size of the final output (for example, blowing up a 3- by 4-inch photo into an 18- by 24-

inch poster is fine). Anything larger than a 3:1 ratio will magnify any defects in the original, or may enhance any inherent limitations of the scanner.

Conversely, you normally don't want to reduce an original to less than half its

*When choosing a
color scanner, you should try
to match the unit to
the size and quality of your
output requirements.*

size (2:1), because in order to reduce an image, the computer must actually throw data away. Ironically, too much discarded data has a similar effect to overinterpolation—allowing the software to create pixels where it thinks appropriate in order to boost the resolution—in that the scanned image may be less sharp or have a distinctly unrealistic look.

The scanner you select should have a resolution that will most closely match the image size and its intended output (in dots or lines per inch). Anything less will yield an inferior image; anything more means that you overpaid for a scanner with capabilities on which you can't completely capitalize.

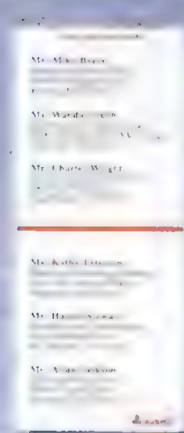
This is one of the reasons why an accessory that scans transparencies may produce disappointing output. A frame of 35-mm film measures 1 by 1.5 inches. Let's assume that your 24-bit scanner has a maximum resolution of 1,000 dpi, which will yield an excellent-quality image when you scan originals at a 1:1 or even a 1:3 ratio. But if your final output is to be, say, 8 by 11 inches, the ratio of a 35-mm slide to the image you want jumps to more than 7:1. This is why transparency attachments work better with larger-format film, such as 4 by 5 inches or even 8 by 10 inches.

Automatic document-feeding attachments, while almost mandatory for businesses that scan text for OCR processing, generally are not helpful for serious

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¹ Every ScanMaker IIg for the Macintosh comes only with **Fractal Design Sketcher 1.0**.

² Requires fax card.

Color Desktop Scanners

graphics scanning. All but the first scan is unattended, so no manual adjustments can be made to contrast, color, or size. Also, the registration is not as precise, so you may inadvertently crop or slew (turn sideways) the image. Then, even with the automatic focus feature that most scanners' software includes, the scanned image may not be as sharp as it would be if it were manually placed on the platen.

The image quality can degrade as a scanner bulb wanes, so the bulb should often be replaced to ensure a scanner's optimal performance. Some scanner vendors provide a free replacement bulb with their scanners.

A new feature found on the Scan-Maker IISP is a color-calibration feature that lets a user recalibrate the scanner to compensate for differences in light-source intensity.

DESKTOP VS. DRUM SCANNERS

Because of their better optical and mechanical components, drum scanners are a step above desktop flatbed scanners in quality and price (see the sidebar

"Commercial Scanners vs. Desktop Scanners"). A few years ago there was a huge qualitative gap between desktop and commercial scanners. An educated eye could quickly spot telltale differences, such as the lack of shadow and highlight detail; "jaggies" (stair-like progressions) on oblique lines and type; color shifts and saturation differences; misregistration where red, green, and blue color channels converged; moiré patterns (geometric patterns where halftoned images are improperly scanned); banding (the tendency for pronounced jumps, or bands, in contrast when scanning in gradients); dropouts (white spots produced by lost data), artifacts (the random addition of lines, dots, or spots that were not in the original), and noise ("snow" sometimes produced from a scanner's CCD, or charged-couple device, when reading a visually confusing image, such as a picket fence or sun streaming through a tree's leaves).

Because of qualitative differences between the two, 24-bit scanners have traditionally been used by graphic-arts

professionals to make proofs and FPO ("for position only") prints, which are used for paste-ups and given to service bureaus as mock-ups for higher-quality scans on commercial drum scanners (in other words, as trial runs for the real thing).

A 24-bit scanner is far and away a more practical, accessible, and affordable solution than a drum scanner for the average PC user who is not involved in high-quality prepress applications. For most of us, a 24-bit scanner should be an easy and inexpensive device to input snapshots, drawings, and text into a PC, to produce visuals for newspaper ads, newsletters, brochures, flyers, company reports, and many other business and personal applications that don't require Madison Avenue perfection.

Today's desktop color devices have appreciably better image quality, and their software makes it easier for the casual user to produce scans without having to go through an apprenticeship or a lengthy trial-and-error learning process. Although an expert can tell the differ-

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► **SUMMARY OF FEATURES**

CONTINUES

Color Flatbed Scanners

Products listed in alphabetical order		Agfa Arcus Plus	AVR 6800/CLX/Pro Image	AVR 8800/CLX/Pro Image	Computer Friends AV-660	DextraPage DF-1200P	Envisions ENV6100	Envisions ENV8100
List price		\$3,950	\$1,375 with Adobe Photoshop for Windows 2.5	\$1,525 with Adobe Photoshop for Windows 2.5	\$1,299 with Aldus PhotoStyler SE	\$895 with iPhoto Plus for Windows 1.1, \$995 with iPhoto Plus for Windows 1.1 and TypeReader 1.0.1	\$799 with Adobe Photoshop 2.5 for Windows LE and TextBridge 1.1	\$999 with Adobe Photoshop 2.5 for Windows LE and TextBridge 1.1
Company		Agfa Division, Miles Inc.	AVR Technology Inc.	AVR Technology Inc.	Computer Friends Inc.	Dextra Corp.	Envisions Solutions Technology Inc.	Envisions Solutions Technology Inc.
Address		200 Ballardvale St., Wilmington, MA 01887	71 E Daggett Dr., San Jose, CA 95134	71 E Daggett Dr., San Jose, CA 95134	14250 N.W. Science Park Dr., Portland, OR 97229	1120 Stewart Ct., Suite A, Sunnyvale CA 94086	822 Mahler Rd., Burlingame, CA 94010	822 Mahler Rd., Burlingame, CA 94010
800 number		800-685-4271	800-544-6243	800-544-6243	800-547-3303	800-339-8725	800-365-7226	800-365-7226
Toll number		508-658-5600	408-434-1115	408-434-1115	503-626-2291	408-737-7566	415-692-9061	415-692-9061
Fax number		508-658-4193	408-434-0968	408-434-0968	503-643-5379	408-737-7565	415-692-9064	415-692-9064
Reader service card number		444	445	446	447	448	449	450
Features								
Engine manufacturer		Toshiba	AVR	AVR	Avison	TECO	UMAX	UMAX
Rated maximum scan area (inches)		8 x 11.8	8.5 x 14	8.5 x 14	8.5 x 14	8.5 x 14	8.5 x 14	8.5 x 14
Optical resolution (dpi)		600 x 1,200	300 x 600	400 x 800	300 x 300	300 x 600	300 x 600	400 x 800
Interpolated resolution (dpi)		1,200 x 1,200 (color), 2,400 x 2,400 (black and white)	1,200 x 1,200	1,600 x 1,600	1,200 x 1,200	1,200 x 1,200	1,200 x 1,200	1,600 x 1,600
Twain driver								
Twain driver and version included		FotoLook 1.0	Easy Scan Twain SRC 1.60	Easy Scan Twain SRC 1.60	Avison 1.2	Dextra Data Source 1.01	Envisions DS 1.2	Envisions DS 1.2
Previewing								
Color		■	□	□	□	□	■	■
Black and white		■	■	■	■	■	■	■
Zoom		□	□	□	□	□	■	■
Cropping		■	■	■	□	■	■	■
Brightness control		■	■	■	■	■	■	■
Contrast control		■	■	■	■	■	■	■
Threshold control		■	■	■	■	■	■	■
Color-gamma control		■	■	■	■	■	■	■
Sheet-feeder option		None	\$499 (list)	\$499 (list)	\$590 (list)	\$350 (list)	\$399 (list)	\$399 (list)
Transparency option		\$1,000 (list)	None	\$700 (list)	\$299 (list)	None	\$599 (list)	\$699 (list)
Warranty		1 year	2 years	2 years	1 year	1 year	1 year	1 year

ence between an image made with a drum scanner and a 24-bit flatbed scanner, most people will find 24-bit scans acceptable for all but quality commercial reproduction.

Having a desktop scanner that can add photo-realistic color to your reports, documents, and correspondence is still considered an option, albeit a very desirable one. But in a couple of years, especially as 24-bit scanners and color printers come down in price even further, color output could become so popular that anyone who doesn't use color will be considered out of date and out of touch. After all, two years ago business associates asked whether you had a fax machine. Today they simply ask for your fax number. Scanners will follow suit.

Agfa Division, Miles Inc.

Agfa Arcus Plus

BY LORI GRUNIN

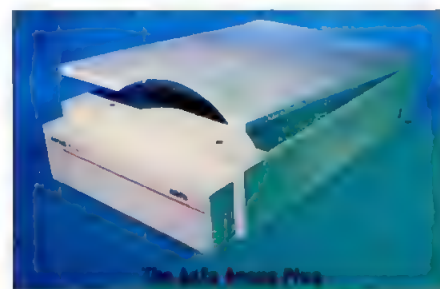
Although the \$3,950 Agfa Arcus Plus is one of the most expensive scanners in this roundup, it only partially succeeds at living up to the expectations raised by its price.

Physically, the unit is reasonably designed. It uses a Toshiba scanning mechanism with an optical resolution of 600 by 1,200 dots per inch that can be interpolated up to 2,400 dpi, and unlike any of the other units in this story, it scans ten bits per color (it then throws out the least-significant two bits for each

primary color and retains the optimal eight bits).

With a scan bed of 8 by 11.8 inches, an optional transparency adapter (\$1,000), but no automatic document feeder, the system is clearly intended for graphics rather than OCR work.

Installation could have been easier. We had to install the SCSI drivers manu-



► **S U M M A R Y O F F E A T U R E S**

CONTINUES

Products listed in alphabetical order

■ = YES □ = NO

	Epson Action-Scanning System	Epson ES-800C Pro	HP ScanJet IICx	KYE Genius ColorPage-I	Microtek ScanMaker II	Microtek ScanMaker IIS	Microtek ScanMaker IIXE
List price	\$999 with Picture Publisher 4.0 LE and Xerox Text-Bridge 1.1	\$1,649 with Picture Publisher 4.0	\$1,179 with Aldus PhotoStyler for Windows SE	\$1,099 with iPhoto Deluxe 1.0 and Recognita Plus 1.2	\$900-\$950 (estimated street price) with Adobe Photoshop for Windows 2.5 LE	\$900 (estimated street price) with Adobe Photoshop for Windows 2.5 LE	\$1,699 with Adobe Photoshop for Windows 2.5
Company	Epson America Inc.	Epson America Inc.	Hewlett-Packard Co.	KYE International Corp.	Microtek Lab Inc.	Microtek Lab Inc.	Microtek Lab Inc.
Address	20770 Madrona Ave., Torrance, CA 90503	20770 Madrona Ave., Torrance, CA 90503	P.O. Box 58059, MS 51L-SJ, Santa Clara, CA 95052	2605 E. Cedar St., Ontario, CA 91761	3715 Doolittle Dr., Redondo Beach, CA 90278	3715 Doolittle Dr., Redondo Beach, CA 90278	3715 Doolittle Dr., Redondo Beach, CA 90278
800 number	800-289-3776	800-289-3776	800-722-6538	800-456-7593	800-654-4160	800-654-4160	800-654-4160
Toll number	310-782-0770	310-782-0770	208-396-2551	909-923-3510	213-321-2121	213-321-2121	213-321-2121
Fax number	310-782-4248	310-782-4248	None	909-923-1469	None	None	None
Reader service card number	451	452	453	454	455	456	457
Features							
Engine manufacturer	Epson	Epson	HP	Microtek	Microtek	Microtek	Microtek
Rated maximum scan area (inches)	8.5 x 11	8.5 x 11	8.5 x 14	8.5 x 13.5	8.5 x 13.5	8.5 x 11.6	8.5 x 13.5
Optical resolution	300 x 600	400 x 800	400 x 800	300 x 600	300 x 600	300 x 600	300 x 600
Interpolated resolution	600 x 600	800 x 800	1,600 x 1,600	1,200 x 1,200	1,200 x 1,200	1,200 x 1,200	1,200 x 1,200
Twain driver							
Twain driver and version included	ES-Twain 1.02	ES-Twain 1.02	HP DeskScan II 2.0	Genius Scan Module 1.31	Microtek Twain	Microtek Twain	Microtek Twain
Previewing:							
Color	■	■	■	■	■	■	■
Black and white	■	■	■	■	■	■	■
Zoom	■	■	■	■	■	■	■
Cropping	■	■	■	■	■	■	■
Brightness control	■	■	■	■	■	■	■
Contrast control	■	■	■	■	■	■	■
Threshold control	□	□	■	■	■	■	■
Color-gamma control	■	■	■	■	■	■	■
Sheet-feeder option	\$599 (list)	\$599 (list)	\$559 (list)	\$599 (list)	\$400 (estimated street price)	\$400 (estimated street price)	\$400 (estimated street price)
Transparency option	\$959 (list)	\$959 (list)	\$759 (list)	None	\$700 (estimated street price)	\$700 (estimated street price)	\$700 (estimated street price)
Warranty	1 year	1 year	1 year	1 year	1 year	1 year	1 year

ally, and we experienced a conflict with DOS's SETVER. If you plan to buy this scanner, make your own SCSI arrangements. The unit we tested used an Adaptec AHA-1510 controller (the only controller sold directly by Agfa), and although other scanners in this story managed to perform extremely well with this adapter, the Arcus needs a much higher-bandwidth adapter to achieve acceptable throughput; it took over 3 minutes for the Arcus to scan our test image, for an average throughput of about 28 kilobytes per second. Agfa claims that performance improves significantly with a higher-throughput adapter, such as the AHA-1742.

The adapter and scanner frequently had problems resynchronizing after scans,

resulting in "Can't find scanner" errors that could only be solved by using the Twain utility in standalone mode or by turning the scanner off and back on (it does not have a reset switch).

Despite its 30-bit scanning, the Arcus displayed one of the smallest color gamuts of the crop, although within its tonal range it has exceptionally tight color balance. Unlike many flatbed models, the Arcus is quite good at capturing shadow detail (it does so at the expense of highlights, which are badly clipped). It also resolves line art very well.

Although the Arcus's high price may have been justifiable in the past, it has been eclipsed by lower-priced, higher-performance units.

AVR Technology Inc.

AVR 6600/CLX/Pro Image

AVR 8800/CLX/Pro Image

BY HOWARD ALEXANDER

The performance of the AVR 8800/CLX/Pro Image (\$1,525) and AVR 6600/CLX/Pro Image (\$1,375) varied in different areas of our tests. Both scanners are saddled with three-pass engines that placed them among the slowest units we tested. Their performance on the whole was less impressive than that of a number of lower-cost units in this roundup.

The 8800 has an optical resolution of 400 by 800 dots per inch (1,600 dpi inter-

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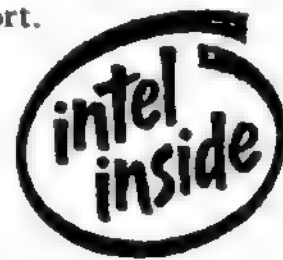
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GRAPHICS HARDWARE

Color Desktop Scanners

SUMMARY OF FEATURES

ENDS

Products listed in alphabetical order

■ = YES □ = NO

List price	\$1,999 with Adobe Photoshop for Windows 2.5 and WordLink	\$4,995	\$1,295 with Adobe Photoshop for Windows 2.5	\$1,995 with Adobe Photoshop for Windows 2.5	\$4,800 with Adobe Photoshop for Windows 2.5	\$2,495 with Adobe Photoshop for Windows 2.5	\$1,895 with Adobe Photoshop for Windows 2.5 LE, \$2,295 with Adobe Photoshop for Windows 2.5
Company	Mustek Inc.	Spark International Inc.	Tamarack Technologies Inc.	Tamarack Technologies Inc.	UMAX Technologies Inc.	UMAX Technologies Inc.	X-Ray Scanner Corp.
Address	15225 Alton Pkwy., Irvine, CA 92718	1929 Waukegan Rd., Glenview, IL 60025	1544 Centre Pointe Dr., Milpitas, CA 95035	1544 Centre Pointe Dr., Milpitas, CA 95035	3353 Gateway Blvd., Fremont, CA 94538	3353 Gateway Blvd., Fremont, CA 94538	4030 Spencer St., Torrance, CA 90503
800 number	800-468-7836	None	800-843-0606	800-843-0606	800-562-0311	800-562-0311	None
Toll number	714-453-0110	708-998-8640	408-956-0144	408-956-0144	510-651-8883	510-651-8883	310-214-1900
Fax number	714-453-1010	708-998-8640	408-956-1552	408-956-1552	510-651-8834	510-651-8834	310-214-1474
Reader service card number	458	450	400	461	462	463	464
Features							
Engine manufacturer	Mustek	Spark	Tamarack	Tamarack	UMAX	UMAX	Microtek
Rated maximum scan area (inches)	8.5 x 13.5	8.5 x 11.7	8.5 x 11.8	8.5 x 11.8	8 x 11.8	8.5 x 14	8.5 x 13.5
Optical resolution	600 x 1,200	600 x 1,200	400 x 800	600 x 1,200	600 x 1,200	600 x 1,200	300 x 600
Interpolated resolution	2,400 x 2,400	2,400 x 2,400	1,800 x 1,800	2,400 x 2,400	2,400 x 2,400	2,400 x 2,400	1,200 x 1,200
Twain driver							
Twain driver and version included	Mustek ScanKit for Windows 2.2	Flatbed Scanner Data Source 2.0	Tamarack Scanner 2.4	Tamarack Scanner 2.4	Twain Driver 2.04	Twain Driver 1.04	Microtek Twain for Windows 1.42
Previewing:							
Color	■	■	■	■	■	■	■
Black and white	■	■	■	■	■	■	■
Zoom	□	□	□	□	■	■	■
Cropping	■	■	■	■	■	■	■
Brightness control	■	■	■	■	■	■	■
Contrast control	■	■	■	■	■	■	■
Threshold control	■	■	■	■	■	■	■
Color-gamma control	■	■	■	■	■	■	■
Sheet-feeder option	\$495 (list)	\$395 (list)	None	None	None	\$495 (list)	None
Transparency option	\$495 (list)	Included	\$895 (list)	\$895 (list)	\$895 (list)	\$895 (list)	Included
Warranty	1 year	1 year	1 year	1 year	1 year	1 year	1 year

polated), while the 6600's optical resolution is 300 by 600 dpi (1,200 dpi interpolated). The 8800 had excellent color scan results—our jury gave it a third-place rating—with a color gamut that indicated tight color response with a relatively even distribution of sensitivity.

The 6600, conversely, posted good gray-scale but poor color imaging (our jury rated it last). The 6600's test results showed an unevenly distributed color gamut, while it showed better gray-scale

sensitivity and a superior response curve than the 8800's. The 6600 tied three other scanners for third place in terms of gray-scale results, while the 8800 placed eleventh.

The two scanners both yielded lackluster results on our line-art test. The higher-resolution 8800 came in last, while the 6600 performed slightly better, placing eighteenth.

Both units posted slow scan speeds. The 8800's test scan took 2 minutes 22 seconds,

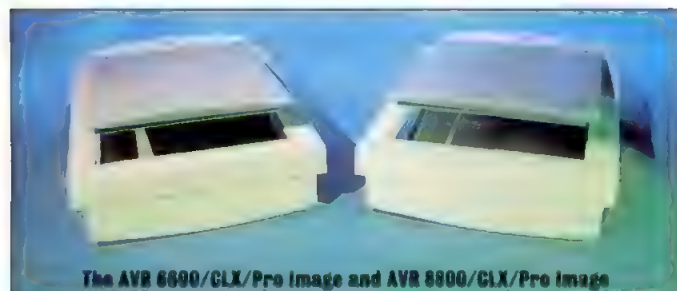
which placed it eighteenth in this review, while the 6600 was slightly faster, at 2 minutes 15 seconds, and came in seventeenth.

The 8800 and 6600 come bun-

dled with excellent Twain drivers and image editing software. Both scanners ship with Adobe Photoshop for Windows 2.5 and AVR's own Easy Scan Twain software.

Easy Scan is a robust program that offers several useful precapture image-processing functions, such as multiple gamma-correction curves, and moiré pattern reduction. It also has an adaptive-thresholding feature that automatically adjusts exposure and contrast. Because Easy Scan runs as a standalone program, you may not always need to use a separate image processing program.

Although Easy Scan provides color-adjustment controls for image capture, its scans can only be previewed in gray scale, not in color. Most of the program's functions are self-explanatory and easy to use. A well-written manual is included



The AVR 6690/CLX/Pro Image and AVR 8800/CLX/Pro Image

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- ❑ Enterprise Messaging Backbone
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- ❑ X.500 Directory Services - DSA/DUA
- ❑ X.400 MTA
- ❑ Scalability
- ❑ Remote/Local Message Store
- ❑ TCP/IP and OSI Transport
- ❑ 3rd Party FAX Server Support
- ❑ Management and Security Features
- ❑ Windows, Macintosh, Motif Clients
- ❑ X.400 User options
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for any further clarification.

A \$499 automatic document feeder is available for both the 8800 and 6600. An adapter kit for scanning in slides and transparencies is a \$700 option for the 8800 only.

The 8800 and 6600 are uneven performers with good software and relatively high prices. Each showed strengths (color on the 8800, gray scale on the 6600) and weaknesses (gray scale on the 8800, color on the 6600, speed and line art on both). The bottom line for users is that there are less expensive, better performers in this story.

Computer Friends Inc.

Computer Friends AV-660

BY JAMES KARNEY

The Computer Friends AV-660 is a middle-of-the-pack performer that offers a solid Twain driver and easy installation. Speedy performance, however, is not its forte. It came in thirteenth in terms of speed when it scanned our 4- by 5-inch,



24-bit image, with an average time of 1 minute 40 seconds.

The AV-660 comes with a Twain driver that offers a host of options and is easy to operate. It can adjust the brightness, contrast, gamma, and RGB channels, and you can also use it to control highlight and shadow ranges. One drawback is that previews are limited to black and white only. Aldus PhotoStyler SE is bundled with the scanner and an ADF is available for \$590.

The AV-660 was easy to set up. Its manual is replete with a series of detailed illustrations that walk the user through the entire setup. There is no SCSI host adapter to contend with, since the AV-660 uses a proprietary parallel-interface card that attaches to a 5-foot cable. We found no problem in getting

the scanner up and running on the first try; this was an especially good thing, since the manual didn't cite how to contact the company's technical-support department.

The AV-660 is an average color desktop scanner. Its ease of installation and operation is appealing, but those who need to do more serious work may want to look at other models.

Dextra Corp.

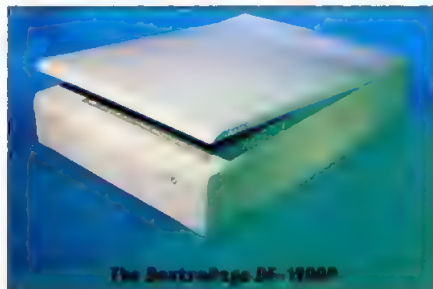
DextraPage DF-1200P

BY BRAD STILWELL

The DextraPage DF-1200P offers reasonably speedy and detailed scans, but its color reproduction isn't on a par with competitively priced top performers. The biggest selling point of this inexpensive, \$895 scanner is its speed. Only one other unit priced under \$1,000—the Envisions ENV6100—performed faster on our speed test. Using an engine supplied by Teco Information Systems, the DF-1200P was the eighth-fastest scanner in our roundup.

The DF-1200P has an optical resolution of 300 by 600 dots per inch, which you can boost to an interpolated resolution of 1,200 dpi. The tested unit had an above-average ability to resolve images, yielding 300 lines per inch horizontally and 450 lpi vertically—much closer to its claimed resolution than most units were to theirs.

The DF-1200P was unable to reproduce many color tones accurately. Our tests showed a smaller-than-average color gamut, leaning toward the lighter and warmer colors of red, orange, and yellow; darker colors such as purple, blue, and green were extremely difficult for it to reproduce. This poor color reproduction reflects the scanner's difficulty in distinguishing gray tones: Only two other units



performed worse on our gray-scale test.

Its Twain driver was easy to use, but the software could not show previews that were magnified. Also, users are limited to previewing color images as gray-scale images.

For an additional \$100, users can buy an OCR package, ExperVision's TypeReader, that normally sells for \$695. A 50-page sheet-feeder is available for \$350. The DextraPage DF-1200T, a similarly configured model with the ability to scan transparencies, is selling for \$1,195 with iPhoto Plus for Windows and TypeReader.

If it weren't for the vastly better color reproduction of units from KYE International Corp. and Microtek Lab, which cost only \$100 to \$200 more, the DF-1200P would be a standout product for its price.

Envisions Solutions Technology Inc.

Envisions ENV6100

Envisions ENV8100

BY DONALD LABRIOLA

The \$799 Envisions ENV6100 and \$999 Envisions ENV8100 are the UMAX UC630 and UMAX UC840 repackaged with new software and lower sticker prices. While neither were outstanding performers, their rock-bottom prices, solid construction, and bundled software make them attractive to home and small-business users hunting for an inexpensive scanner.

Each scanner is based on the same rugged UMAX scanning engine, has a 128K I/O buffer, an 8.5- by 14-inch scanning area, and a reliable three-pass scanning mechanism. Both have lids that are hinged in the middle to make it easier to scan three-dimensional objects and thick books, and they can be fitted with Envisions Solutions Technology's transparency adapter (\$599) and automatic document feeder (\$399).

The ENV6100 supports a resolution of 300 by 600 dots per inch, but the ENV8100 is fitted with higher-quality optics that increase its resolution to 400 by 800 dpi. Bundled software further enhances the two units' resolutions to 1,200 and 1,600 dpi, respectively.

GRAPHICS HARDWARE

Color Desktop Scanners

The ENV8100 turned in solid but unexceptional performance in most areas. It ranked in the middle third of the list in our line-art and gray-scale tests, and although most of the units that did better are more expensive, a few such as the HP ScanJet IIcx are priced in the same ballpark.

Our speed test told a similar story. The

tions of the Twain and SCSI protocols. Furthermore, although the interface card is a relatively simple 8-bit adapter, both scanners are actually SCSI-2 devices that can be plugged into any SCSI controller that works with Adaptec's ASPI drivers.

Like most of the units we tested, the Envisions scanners are bundled with

Adobe Photoshop for Windows 2.5 LE. These scanners also include Xerox Imaging Systems' excellent TextBridge 1.1, an OCR package for Microsoft Windows that reliably translates text,

even reproducing italics, boldface, and page layouts accurately. Envisions' Twain driver includes features like the ability to control shadow, midtone, and highlight curves independently and an on-screen densitometer that displays the RGB components of pixels in a scan preview.

Not too long ago, both these scanners would have been considered great bargains. But today the ENV8100, which has the lowest sticker price of any unit we tested, is clearly outclassed by the models from Epson America, Hewlett-Packard Co., and Microtek Lab.

Epson America Inc.

Epson ActionScanning System Epson ES-800C Pro

BY LORI GRUNIN

Epson America's two scanners, the \$999 Epson ActionScanning System and the \$1,649 Epson ES-800C Pro, are attractively priced, but when the output is in, only the ES-800C produces the relatively high-quality images that you should expect from a flatbed scanner.

"ActionScanning System" is really no more than a catchy name for the Epson ES-600C scanner bundled with Micrografx's Picture Publisher 4.0 LE and either a bidirectional parallel port

or a SCSI interface. The ActionScanning System has an optical resolution of 300 by 600 dots per inch (it can interpolate up to 600 dpi), and it uses Epson's original one-pass scanning technology. But despite its competitively low price and fast scanning (fourth place on our speed test), the poor tonal range produced by the unit reduces its bargain appeal.

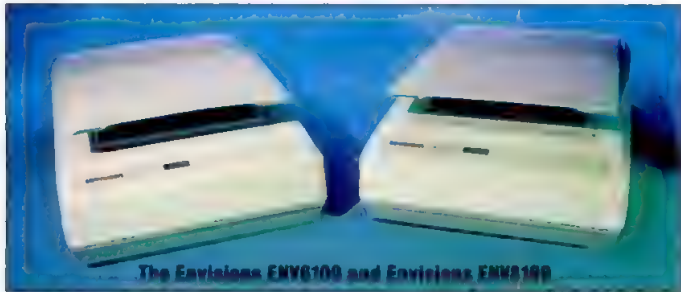
Unfortunately, the ActionScanning System's color gamut is rather small; the gray scale never reaches true black, and since the scanner consistently reads reds and greens more strongly than blues over most of the range, it has poor color balance and registration that manifests itself as a shift to yellow. It has a line-art resolvability of 203 lines per inch, so for OCR work on small print, you may want a more sensitive unit.

For a higher price, the ES-800C offers better image quality and higher resolutions—400 by 800 dpi optical and 800 dpi interpolated—than does the ActionScanning System. It comes bundled with the full version of Picture Publisher 4.0 and includes additional scanner drivers.

The ES-800C took only 47 seconds to scan our test image; it ranked third, after the HP ScanJet IIcx and Spark Spectrum Scan III.

Unlike its less capable sibling, the ES-800C can scan in either one-pass or three-pass mode. Our tests, conducted in three-pass mode, indicated that the unit has a relatively large color gamut, but one that is smaller than those of several competitors, including the HP unit and two of the Microteks.

While it tends to push the greens and lose the blues slightly in midtones, the ES-800C had the best color balance of all the units we tested. Also, we could visually differentiate 28 of the 37 patches of our gray-scale gamut—more than any other scanner in this story. The ES-800C could only resolve line art as fine as 4.5 cycles



The Envisions ENV8100 and Envisions ENV8100

ENV8100 outperformed a number of more expensive units, was surpassed by a few lower-price machines, and wound up right around the middle in twelfth place.

Our color testing produced mixed results. The ENV8100 produced very tight RGB color-accuracy curves and demonstrated a superior dynamic range at the low end of the brightness scale. But its gamut was one of the smallest of any unit we tested. All this might have been acceptable in a \$999 unit that offers 1,600-dpi resolution and a good OCR package, but the ENV8100's performance according to our jury was discouraging; its printed output came in fourth from last, and it particularly produced poor skin tones and shadow details.

On our speed test, the less-expensive ENV6100 outranked the ENV8100, coming in seventh. Its color gamut was also very good, but this scanner's performance in other areas was lackluster. It tied for second-to-last place in our line-art evaluation, and its RGB curves showed weak blues and difficulty resolving darker colors. This problem also showed up in the ENV6100's gray-scale resolution, which was the worst we measured, primarily because of problems differentiating darker shades. In our visual evaluations, problems with shadow details helped place the ENV6100 second to last.

The ENV6100 and ENV8100 come with a PC or PS/2 interface card, cabling, several good application software packages, a plug-in Twain driver, and a spare light bulb. There's also a well-written and fully indexed manual that includes topics like basic scanning techniques and descrip-



The Epson ActionScanning System and Epson ES-800C Pro

per millimeter, however, which makes it a less attractive alternative for OCR than are many of the other units.

Scanning novices will probably appreciate the driver's attempts to provide consistency through the scan-edit-print process. Similar to HP's utility, the Epson Twain driver lets you apply correction curves based on an output device and display type, and it comes with preset resolutions and curves for a given set of devices. This driver is also one of the few to offer a useful zoomable preview.

Unfortunately, professionals will chafe within the driver's restrictions. For instance, you can choose only from among a series of preset scanning resolutions; although these cover the range of most-often-used values, it limits your flexibility and ends up forcing you to scan at a higher resolution than you might otherwise have used. Furthermore, there is no way to turn the device calibration off; you must always target a specific display or printer type.

If you need greater control, keep in mind that Picture Publisher includes a proprietary but much more flexible driver for both scanners.

Both the ActionScanning System and ES-800C are easy to install, simple to use, and attractively priced given their capabilities. But the ES-800C's better image quality makes it more attractive than its sibling.

Hewlett-Packard Co.

HP ScanJet IIcx

BY HOWARD ALEXANDER

Hewlett-Packard Co. has consistently come up with top-notch scanners, and the new HP ScanJet IIcx continues that trend. Set to replace the HP ScanJet IIc, the \$1,179 ScanJet IIcx is a 24-bit single-pass gem that's cheaper, faster, and offers an optical resolution of 400 dots per inch, which can be interpolated to 1,600 dpi.



The price and performance of the ScanJet IIcx earned it an Editors' Choice award.

The ScanJet IIcx performs its job very well. The ScanJet IIcx was the fastest of all the units in our roundup on our speed test (28 seconds). It showed a wide color gamut with purposeful skewing toward red to enhance the brightness of images.

*Hewlett-Packard
has consistently come up
with top-notch
scanners, and the new
HP ScanJet IIcx
continues that trend.*

Its color scans were the best in this review (along with the Microtek ScanMaker IISP's), and compared well to the originals.

The ScanJet IIcx's gray-scale imaging was also excellent. (For those who want a gray-scale scanner only, HP offers the 300-dpi, \$879 HP ScanJet IIp.) The ScanJet IIcx showed very fine gray-scale-level sensitivity and the ability to produce true black. Line art was reproduced with accuracy, and if you need to do much OCR work, you will find that the ScanJet IIcx can resolve even small fonts.

HP licenses its proprietary AccuPage 2.0 technology to major OCR manufacturers. OCR applications that incorporate AccuPage let the ScanJet IIcx and ScanJet IIp scan text from colored or stained backgrounds without losing a document's original format.

Installing the ScanJet IIcx was a breeze. HP provides a self-configuring SCSI adapter that eliminates the need to determine addresses or set jumpers. A copy of Aldus Photostyler for Windows SE is included, along with a robust Twain driver that performs many of the functions of a photo-processing program.

HP has produced a well-balanced unit, where fast speed is complemented by excellent output. This performance, coupled with aggressive pricing, makes the ScanJet IIcx a winner.

KYE International Corp.

KYE Genius ColorPage-I

BY JAMES KARNEY

The \$1,099 KYE Genius ColorPage-I is KYE International Corp.'s version of the Microtek ScanMaker II. The ColorPage-I may appeal to the budget-minded, who won't mind using slightly outdated technology to get a bargain on a scanner bundled with image-editing and OCR software.

The ColorPage-I produces 300 by 600 dots per inch optically and 1,200 dpi interpolated. It performed reasonably for a three-pass scanner, coming in sixth on our speed test, with an average speed of 1 minute 23 seconds for imaging a 4-by 5-inch, 24-bit picture at 300 dpi. Its has a maximum scan area of 8.5 by 13.5 inches.

The bundled bitmap editor is iPhoto Deluxe 1.0. While it's not a major name in imaging packages, the package does



offer all the basic features you'll need for scanning, touch-ups, and some special effects. If you want full features, you may need to add a second program to your library. Also included is a copy of Recognita Plus 1.2 for handling OCR.

The ColorPage-I was not one of the easiest scanners to install. The setup process requires adding the driver, loading the software, and then configuring the program so that it can find the driver's memory address. The Twain driver produced a "Not Enough Memory" message every time we used it, but it worked.

The KYE Genius ColorPage-I shows that there is still some life left in the old ScanMaker II design, and while it may lack the features of newer models, it will still meet the needs of less demanding users.

Microtek Lab Inc.

Microtek ScanMaker II

Microtek ScanMaker IISP

Microtek ScanMaker IIXE

BY DONALD LABRIOLA

The new Microtek ScanMaker IISP (\$900 on the street) has innovative color-calibration software and superb output quality surpassing that of every other scanner in our survey. The popular Microtek ScanMaker II (\$900 street price) and Microtek ScanMaker IIXE (\$1,699 street price) weren't as impressive as their younger sibling, but both produced solid test results. These older units will remain a part of Microtek Lab's product line, with lower prices that haven't yet been set. And while none of the Microtek scanners could match the HP ScanJet IICx's speed, the ScanMaker IISP's quality output, pricing, and calibration system earned it an Editors' Choice, along with the HP machine.

The ScanMaker II and ScanMaker IIXE differ only in their software bundle, whereas the ScanMaker IISP is based on a new engine. The ScanMaker IISP has a scanning area (8.5 by 11.6 inches) that's smaller than the older model's (8.5 by 13.5 inches), and it uses a CCD mechanism that scans color images in one pass (the other two scanners use three-pass mechanisms).

All three ScanMakers support 300- by 600-dot-per-inch optical resolution that can be enhanced through software to 1,200 dpi. The ScanMaker II and ScanMaker IISP ship with Adobe Photoshop for Windows 2.5 LE, while the ScanMaker IIXE is bundled with the full edition of this package. Each scanner comes with one of Microtek's plug-in scanning utilities. The PC models also come with a proprietary 8-bit interface card and, by the time you read this, they should also work with any ASPI-compliant SCSI adapter.

The Microtek plug-in Twain module is an excellent program chock full of features. It has all the standard functions, such as brightness and contrast control, color or black-and-white scan previewing,

cropping, and zooming; image-mirroring and control over color depth, scaling, and resolution. It also offers individually adjustable RGB channels and independent control over shadow, midtone, and highlight areas. In addition, the Twain module has an on-screen densitometer that displays the color values of pixels in a prescan. It has six speed settings, as well as filters and special effects that offer blurring, sharpening, edge-enhancement, and embossing features. Furthermore, once you assemble a range of settings that work well with a particular image, you can name them and save them to disk for future use.

When you buy the ScanMaker IISP,



you also get a copy of Microtek's Dynamic Color Rendition (DCR) software. DCR is a color-calibration system for monitors and scanners that was originally developed for Microtek's high-end ScanMaker 45t, a transparency scanner. This mechanism seems to have worked well, because the ScanMaker IISP's color output was clearly the best of any scanner in our survey and much better than that of the other two ScanMakers. Our jury gave it enthusiastic ratings in every category, but it was the quality and balance of the entire image that most impressed the judges.

The ScanMaker IISP's other test results, however, weren't quite as remarkable. It placed an encouraging fourth in line-art resolution, beating every unit under \$1,999, but it ranked fifth from last on our gray-scale test. Its RGB curves were shy in blues, and its color gamut was average. On our speed test, the ScanMaker IISP came in ninth, more than twice the speed of the last-place Agfa Arcus Plus but less than one-third as fast as the top-performing ScanJet.

The ScanMaker II and ScanMaker IIXE are older machines that produced

middle-of-the-road results on most of our tests. Despite being based on identical hardware, the two units we tested never produced identical results. RGB curves showed both models biased toward greens and lacking in reds, more so for the ScanMaker II. The ScanMaker II also took about 35 percent longer to complete our speed test, winding up in sixteenth place, below the ScanMaker IIXE's tenth-place finish. Our resolution curves indicated that the ScanMaker II had trouble differentiating the colors at the darker end of the spectrum. But despite these problems, the ScanMaker II earned sixth-place in our subjective visual evaluations, well above the Scan-

Maker IIXE, which came in fifteenth.

Unit-to-unit variability probably accounts for some of the differences between the two units, and variations in light bulbs may have also

affected color performance and scanning speed.

Although the DCR-calibrated ScanMaker IISP was the only one of the three that produced exemplary test results, if Microtek lowers the price of its older units, all three models should be excellent values.

Mustek Inc.

Mustek Paragon 1200

BY ROBIN B. BORNSTEIN AND
RICHARD FISCO

In testing the Mustek Paragon 1200, we found that more is not always better. Although its optical resolution is 600 by 1,200 dots per inch (2,400 dpi through software interpolation), the Paragon's displayed and printed scans were muddy and washed out. It also was among the slowest scanners in this review, placing twentieth of 21 products, while its \$1,999 list price was higher than several of the better performers.

The Paragon's scan bed is 8.5 by 13.5 inches. The Twain-compliant Data Source drivers had an easy-to-use interface, as well as good brightness, contrast,



gamma correction, and speed adjustments. However, the drivers lacked zoomable prescan and auto-adjustments for color and contrast.

Testing did not go smoothly with Mustek's Data Source drivers. The Program Manager box would pop up and eclipse the image, and scanning would occasionally lock up the computer.

The scanner showed a disappointingly small color range, and its RGB color-accuracy curve showed a shift away from red. (Although not a requirement for producing a totally accurate color image, we've discovered that a shift toward red produces a pleasing look to the human eye.)

A bright spot for the Paragon was its first-place score on our line-art test. Its gray-scale clarity and high line resolution (410 vertical and 480 horizontal lines per inch) make it an excellent choice for OCR or line-art scanning.

With a more aggressive price point and some debugging of its Twain driver, the Paragon could provide value on a par with that of most second-tier players in this review. And it can outperform most of those units as an OCR and line-art scanner.

Spark International Inc.

Spark Spectrum Scan III

BY JAMES KARNEY

If you want a fast scanner that can handle both paper and transparencies, the Spark Spectrum Scan III will fill the bill, but for a hefty \$4,995 list price. For that price you get the scanner, a Data Technology 3150 SCSI-2 Host Adapter, and no image-editing software.

This single-pass flatbed scanner posted the second-best speed score of all the products we tested (40.7 seconds to produce a 4- by 5-inch 24-bit scan at 300 dots per inch), trailing only the HP ScanJet IIcx. The Spectrum Scan pro-

vides 600 by 1,200 dpi and has a maximum interpolated resolution of 2,400 dpi. It can handle materials as large as 8.5 by 11.7 inches. A 50-page sheet feeder is available for \$395.

Although we did not test its ability to scan small slides, the vendor claims the machine can provide images from 35-mm film as long as the film is a positive, not a negative. It comes with an arm that can be used to convert it easily from reflective to transparency mode. As for the image quality, the Spectrum Scan was a moderate contender, with average scores during our subjective evaluations. The actual resolution on our test scans were 310 to 320 lines per inch, a bit better than most of the other reviewed units produced but still



below the 400- to 500-lpi reading of the Mustek Paragon 1200.

Installing the unit was straightforward. The only real quirk we encountered was that the scanner must be turned on after the PC. To be recognized by the computer's host adapter, most SCSI devices need to be warmed up before the PC is booted.

If speed is what you're looking for, the Spectrum Scan may be worth investigating.

Tamarack Technologies Inc.

Tamarack 8000C

Tamarack 12000C

BY HOWARD ALEXANDER

The Tamarack 8000C and Tamarack 12000C did not deliver the performance their impressive spec sheet numbers might have led us to expect. The rated resolution of the 12000C is an interpolated 2,400 dots per inch (600 by 1,200 dpi optical), while the 8000C offers an interpolated 1,600 dpi (400 by 800 dpi optical). While these rated resolutions are high, the speed and output quality of the scanners were not outstanding.

Although our jury rated the 12000C near the bottom of the pack in terms of its color performance, Tamarack Technologies provides a set of robust tools within its Twain driver for tweaking the images. Surprisingly, the color images scanned on the less expensive 8000C looked better than those on its more expensive sibling (again, in the default setting). The 8000C also showed a larger color gamut than the 12000C did, with better color distribution.

The quality of the two Tamarack units' gray-scale results was the opposite of their color output, with the 12000C outperforming the 8000C. Although the 12000C's gray-scale results were among the best (third-place on our gray-scale test), its ability to scan black was limited. The 8000C's gray-scale result earned it a ranking near the bottom of the pack, although it was able to achieve true black. Both Tamaracks fared well on our line-art test; the 12000C placed second and the 8000C came in sixth.

The Tamarack scanners' test speeds were among the slowest of our roundup (which is not surprising with three-pass color scanners). Their scanning speeds placed them among the bottom six on this test. The lower-resolution 8000C proved faster than the 12000C (with average times of 2 minutes 8 seconds and 2 minutes 24 seconds, respectively).

Installing the two Tamaracks was relatively easy. Both units use the same Twain driver, which provides several other useful features in addition to standard functions like brightness, contrast, color adjustment, and resolution selection. Among these are the ability to create or use stored (gamma) color-adjustment curves and select highlight and shadow references. The driver also offers a large number of halftone patterns.

Despite its useful features, the Twain interface was marred by bugginess—particularly on the 12000C, where the system would lock up during preview and scan modes and then required a cold reboot. In addition, the cursor would often freeze or randomly disappear.

Both units offer a letter-size scanning area of 8.5 by 11.8 inches. The articulated cover on both units worked well when scanning pages from books. A transparency adapter is available for \$695, and

GRAPHICS HARDWARE
Color Desktop Scanners

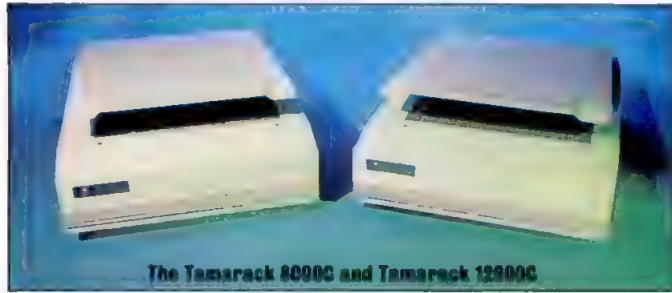
an automatic sheet feeder should be available by the time you read this.

Although the 12000C does very well when scanning line art (as does the

and an excellent 140-page manual.

The PC and PS/2 models also include an 8-bit SCSI controller, but the scanner will work with any Adaptec AS-

PI-compliant SCSI interface card. An 8.5- by 11-inch transparency adapter is available for the UC1200SE and UC1260, and the latter also has an optional 25-sheet automatic



The Tamarack 8000C and Tamarack 12000C

8000C), its performance as a color scanner cannot earn it any kind recommendation. In turn, the 8000C offers good results with color scans, but as with its sibling, it fails to deliver adequate universal performance.

UMAX Technologies Inc.

UMAX UC1200SE

UMAX UC1260

BY DONALD LABRIOLA

At \$4,600, the UMAX UC1200SE is one of the most expensive and sophisticated units in this year's roundup. It offers an innovative high-resolution scanning engine and the kind of rugged construction that appeals to demanding publishing professionals. The \$2,495 UC1260 is a less ambitious product. Despite the UC1200SE's impressive across-the-board test results and the UC1260's solid, middle-of-the-road performance, both units were outclassed by units from Epson America, Hewlett-Packard Co., and Microtek Lab that sell for about a third of the UC1200SE's street price.

The higher-end, UC1200SE has an impressive set of specifications. It offers an optical resolution of 600 by 1,200 dots per inch that can be enhanced to 2,400 dip, a 2MB I/O buffer, and 30-bit internal color depth that lets it recognize over a billion colors. It comes with an outstanding Twain driver, the full version of Adobe Photoshop for Windows 2.5, lifetime toll-free support,

document feeder.

The UC1200SE's precision scanning engine uses a color-imaging element that executes one-pass color scans without requiring multiple lamps, color filters, or prisms. UMAX Technologies claims that its engine provides better registration and superior long-term reliability by eliminating the alignment problems arising with one-pass systems that use three monochromatic imagers. The UC1200SE also has an unusually high optical density value, which indicates its ability to differentiate very close shades of color and gray. UMAX feels that this parameter is even more critical than a scanner's color accuracy or gamut; if a scanner can't differentiate between 5 and 7 percent black, for example, no software package will be able to compensate for the lost information after the fact.

The UC1200SE performed well on our test suite. Its huge I/O buffer helped it capture fifth place in scanning speed, and its gray-scale performance was surpassed only by the Epson ES-800C Pro, but it produced merely average results on our line-art test. The color evaluations revealed a small gamut and the tendency to understate blues and exaggerate reds, but the unit was good at differentiating colors at the extreme ends of the spectrum, which, like its excellent gray-scale

response, is something you would expect from a unit with a high optical density.

According to our jury, the UC1200SE showed no profound weakness in any single place, its default-scan quality was judged beneath that of lower-price scanners such as the HP ScanJet IICx and Microtek ScanMaker IISP.

The UC1260 offers the same resolutions as its more expensive sibling (600 by 1,200 dpi optical and 2,400 by 2,400 dpi interpolated), and it is packaged with the same software and hardware. But it has lower-resolution, 24-bit internal color and a less sophisticated three-pass scanning mechanism. Also, its 8.5- by 14-inch scanning area is larger than the UC1200SE's 8- by 11.8-inch bed.

The UC1260 didn't do as well as the UC1200SE on our test suite. It scored about average on our line-art test and was second from last in terms of its gray-scale resolution. It came in eleventh on our speed test, taking about 44 percent longer to scan than the UC1200SE, partly due to the fact that it lacks the other unit's robust I/O buffering and one-pass, single-bulb scanning mechanism. Its color gamut was relatively small, and its RGB curves showed red-blue shifts somewhat worse than those of the UC1200SE. Both its gray-scale and color results indicated considerable difficulty resolving darker tones. On our visual evaluations, the UC1260 was ranked around the middle of the pack in each judging category.

Both the UC1260 and the UC1200SE are well designed and attractively packaged, offer 2,400-dpi resolution, and are built to last. But both scanners were outperformed at 300 dpi by at least a few less expensive, lower-resolution units. They suffer only by comparison, and both models become competitive when used in applications that require higher-resolution scanning.

X-Ray Scanner Corp.

XRS OmniMedia 12c

BY DONALD LABRIOLA

Not just a repackaged Microtek ScanMaker II, the XRS OmniMedia 12c actually incorporates significant modifications that give it built-in transparency-scanning capabilities. These enhancements boost the

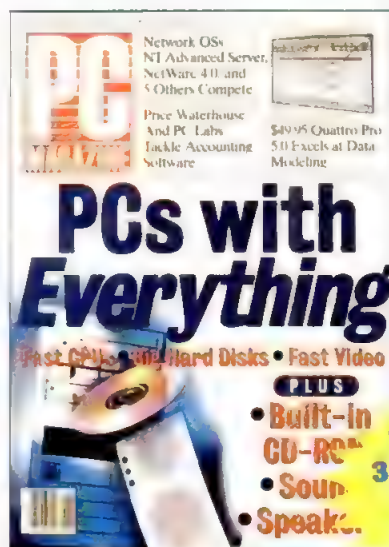


The UMAX UC1200SE and UMAX UC1260

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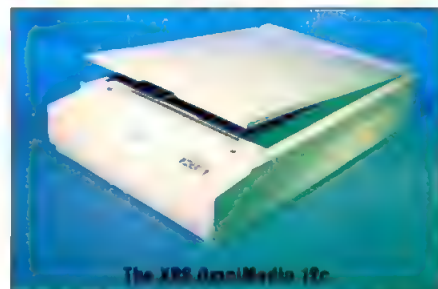
Color Desktop Scanners

price of the OmniMedia considerably (it costs from \$1,895 to \$2,295, depending on bundle), but if you need to scan large transparencies, it can be a very good buy.

The OmniMedia is based on the same scanning engine and optics that Microtek Lab uses for its ScanMaker II and ScanMaker IIXE. Like the ScanMakers, the OmniMedia has an optical resolution of 300 by 600 dots per inch (software-enhanced to 1,200 dpi), a built-in SCSI interface, either the standard or limited edition of Adobe Photoshop for Windows 2.5, and a well-designed plug-in Twain driver.

The main feature that differentiates the OmniMedia from the Microtek units is an innovative mechanism that lets you quickly convert the unit into a transparency scanner. By snapping off a small plate and pulling out the scanning lamp, you can swing the bulb around to light originals from above. The procedure is easier and more elegant than attaching a bulky transparency hood, and it lets the OmniMedia scan originals that fill its entire 8.5- by 13.5-inch scanning area. It's also useful for scanning other media, such as cloth fabrics, that benefit from overhead lighting.

The OmniMedia's results fell between those of the two ScanMakers on our speed test (fourteenth place) and jury rating (twelfth place). It tied for twelfth place on our gray-scale and line-art tests. The OmniMedia had a rather limited color gamut, and its RGB curves showed color shifts that exaggerated greens and understated blues. Shadow details looked good, but the output



wasn't as impressive with subtle mid-tones and warmer colors.

As a general-purpose unit, the XRS OmniMedia 12c is a middle-of-the-road performer that may appeal to users who desire a transparency option, but it was clearly outclassed by other, less expensive scanners. □

User-to-User

BY NEIL J. RUBENKING

Getting Text Input In a Batch File

I found the 30-byte ASK.COM program (Solutions, April 27, 1993) a handy tool for obtaining single-character input in a batch file, but there are times when the ability to prompt for a text string would be useful. For example, a batch file might need to ask for a complete path and filename with parameters.

The example batch file INPUT.BAT in Figure 1 illustrates a method to do this. It depends on the file INPUT.ASC, which contains nothing but the line SET INTYP= without a carriage return. To create this file from the DOS command line, enter the command COPY CON INPUT.ASC, type SET INTYP=, then press Ctrl-Z and Enter. You can't create it from within a batch file or by using DOS's EDIT utility, since they insist on adding a carriage return.

INPUT.BAT was inspired by Robert W. Miller's LENGTH.BAT (User-to-User, January 26, 1993), but it sends the entire response string to the environment

variable INTYP. Spaces are accepted, but if you enter more than one line, the SET command uses only the first line. This line is also limited to the maximum length allowed for an environment variable, 127 characters.

*Donald G. Chapman
Chevy Chase, Maryland*

► **PC MAGAZINE:** In fact, the maximum effective length of the input line is the command line limit of 127 characters *minus* the length of the string "SET INTYP=",

or 117 characters. You can type in 127 characters, but only 117 will be used. In most cases, this limitation shouldn't be a problem.

INPUT.BAT has one small problem that's easily demonstrated. Run INPUT.BAT and type your name, then Enter, then DIR. When you press Ctrl-Z and Enter to end your response, that DIR command will be executed! Any time the user types more than one line before pressing Ctrl-Z, the remaining lines will be treated as commands, with possibly disastrous results.

On a system with ANSI.SYS loaded, you can protect the user from this possibility by temporarily redefining the Enter key to send two key codes, Ctrl-Z and Enter. Then when the user presses Enter at the end of the line, it will automatically terminate the input process. Figure 2 shows a modified version of INPUT.BAT that includes this safeguard and also eliminates one of the temporary files. The first ECHO line ends with an ANSI command to redefine Enter (ASCII character 13) as Ctrl-Z and Enter

INPUT.BAT

Complete Listing

```
@ECHO OFF
ECHO What is your input?
ECHO Follow reply by [Ctrl-Z], [Enter]
COPY CON $$$BAT >NUL
COPY INPUT.ASC+$$$BAT $$BAT >NUL
CALL $$
DEL $$?.BAT
ECHO Your input was "%INTYP%"
```

Figure 1: This batch file demonstrates a method for getting text input from the user.

INPUT2.BAT

Complete Listing

```
@ECHO OFF
REM ^[ in the line below represents the Escape character
ECHO What is your input? ^[[13;26;13p
COPY INPUT.ASC+CON $$BAT >NUL
CALL $$
DEL $$BAT
REM ^[ in the line below represents the Escape character
ECHO Your input was "%INTYP%" ^[[13;13p
```

Figure 2: This variation on INPUT.BAT avoids forcing the user to end input by pressing Ctrl-Z.

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(26 and 13). The second ECHO line ends with an ANSI command to restore the original definition of the Enter key.

Note that each of the ANSI commands begins with an escape character, represented by a caret and a left bracket (^[). In order to create a batch file that uses ANSI commands in this way, you need an editor that lets you insert the escape character. The *PC Magazine* utility TED is such an editor, but if you have DOS 5.0 or later, you can simply use the EDIT program that comes with DOS. To insert the escape character, just press Ctrl-P followed by the Esc key.

You can download both of the batch files mentioned here from PC MagNet's Utilities/Tips Forum archived as INPUTT.ZIP.

Testing Environment Variables

In a batch file that uses environment variables, it would be good programming practice to test whether a given variable is already in use before you attempt to change it. You might think at first that you could simply filter the output of the SET command, as in TESTVAR1.BAT (Figure 3). If SET's output

does not contain the variable name specified on the command line, TEMP0001.\$\$\$ will be a zero-byte file. The COPY command won't copy zero-byte files, so TEMP0002.\$\$\$ will exist only if the parameter names a variable.

This method is inefficient, however, since it requires the creation of three temporary files (the two TEMP000?.\$\$\$ files and one created by DOS for the piping operation). I found a better way using percent signs around variables.

The batch file TESTVAR2.BAT, as shown in Figure 4, creates a single temporary batch file that reports whether the parameter is an environment variable. In place of the lines that ECHO whether the parameter is a variable, you could branch to another part of the batch file or set a different variable to indicate that the given string is a variable. This method requires just one temporary file and is much faster than using FIND.

In a batch file that uses environment variables, it would be good programming practice to test whether a given variable is in use before you attempt to change it.

►PC MAGAZINE: TESTVAR1.BAT has more problems than just an excess of temporary files. Suppose the SET command's output contains the line PROMPT=\$p\$g. TESTVAR1.BAT will report that ROMPT, OMPT, MPT, PT, and T are all variables, along with any

other substring contained in that line. Clearly another solution is in order!

To understand TESTVAR2.BAT, you need to know just how DOS processes the percent signs in a batch-file line. DOS goes through the line once, from left to right, and when it finds a percent sign it checks the next character. If the next character is also a percent

sign, DOS replaces the two with a single percent sign. If that character is a digit, DOS replaces the percent sign and digit with the value of the corresponding command line parameter. If it's anything else, DOS treats everything up to the next percent sign as the name of an environment variable and replaces it with the value of that variable.

Because DOS makes just one pass through the command, you can't get the value of a variable whose name is contained in another variable or command line parameter. What you can do is create another batch file to perform that second evaluation, and that's what TESTVAR2.BAT does. Look at the string %%%1%% in the third line. DOS reduces the initial pair of percent signs to a single percent sign, replaces %1 with the value of the first parameter, and replaces the final pair of percent signs with another single one. If the parameter was PROMPT, %%%1%% will become %PROMPT%. When that expression is evaluated in the secondary batch file, it's replaced by the value of the PROMPT variable. If this value is nonempty, the secondary batch file reports that the variable exists.

You can download both TESTVAR 1 and 2 from PC MagNet's Utilities/Tips Forum archived as TESTVA.ZIP. □

TESTVAR1.BAT

Complete Listing

```
@ECHO OFF
IF %1.==. GOTO :END
SET | FIND /I "%1=" > TEMP0001.$$$
COPY TEMP0001.$$$ TEMP0002.$$$ > NUL
IF EXIST TEMP0002.$$$ ECHO %1 is a variable.
IF NOT EXIST TEMP0002.$$$ ECHO %1 isn't a variable!
DEL TEMP000?.$$$ > NUL
:END
```



Figure 3: This batch file demonstrates a less effective way to determine whether a user-supplied parameter is the name of an environment variable.

TESTVAR2.BAT

Complete Listing

```
@ECHO OFF
IF '%1'=='' GOTO END
ECHO IF NOT '%%%1%'=='' ECHO %1 is a variable. > TSTIFVAR.BAT
ECHO IF '%%%1%'=='' ECHO %1 isn't a variable! >> TSTIFVAR.BAT
CALL TSTIFVAR > NUL
DEL TSTIFVAR.BAT
:END
```



Figure 4: TESTVAR2.BAT uses a secondary batch file to get the value of the environment variable named in its first parameter.

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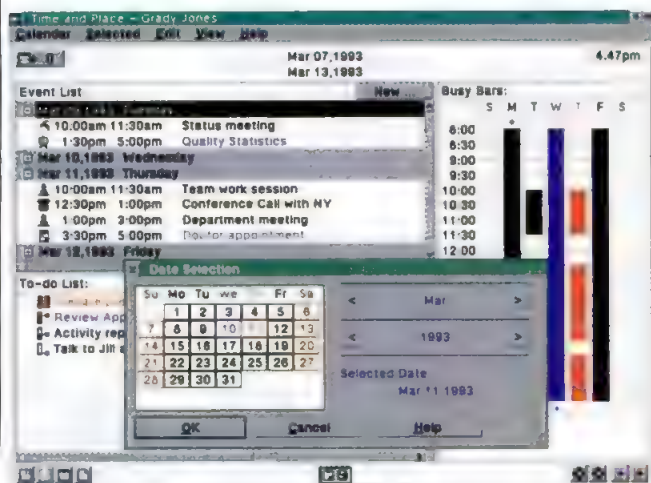
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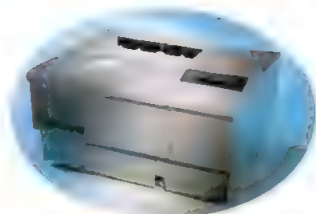


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Extending Your Apps

BY RICK DOBSON

A Pretty Face for Your 1-2-3 Apps

For all of 1-2-3, Release 4.0's, many improvements, its time-proven macro language, which has been around since Release 1.0, remains among its most potent features. This is not to say that Release 4.0 offers nothing special for Windows users. Its new interface capabilities, for example, are powerful tools that let you give your Lotus macros a Windows look and feel with programming techniques that you already know from previous versions of 1-2-3. In this article, you'll learn how to design and present custom dialog boxes and menus with 1-2-3 macros in a hypothetical sales information system.

DESIGNING A CUSTOM DIALOG BOX Windows applications simplify user input through dialog boxes, and the Lotus Dialog Editor included with Release 4.0 makes quick work of creating custom dialog boxes. This standalone Windows application lets you draw, position, and size dialog boxes and their Windows-style controls.

Figure 1 shows a completed dialog box whose components—a combo box along with a text message and a couple of buttons—make it easy to select a single quarter of the sales year by picking one filename from a list. Clicking on one of the filenames in the bottom part of the combo box enters that name into the top part, and clicking OK selects this name and closes the box.

Designing this dialog box takes just a couple of minutes. After choosing File, selecting New, and giving the file a name (for example, OPENONE) and title ("One quarter sales open dialog"), drag the blank dialog box to the desired position. Next, add the combo-box element

by clicking on the SmartIcon for a Combo box and position it within the blank dialog box. Finally, add the buttons and the static text to the box (Figure 2).

When your design is complete, incorporate it into your worksheet file. First, copy the completed dialog box to the Windows Clipboard. Next, switch to 1-2-3, Release 4.0. Position the cell pointer in a cell with plenty of blank space to the right and below and click on Edit, Paste. This copies a table of numbers and text strings (Figure 3) into your worksheet file so that 1-2-3 can reconstruct the dialog box.

Assign a range name to the dialog box table. You'll use this name with the DIALOG command to display the dialog box in your macros. Be sure to extend the named range over eleven columns, starting with the leftmost column of the table.

The table's first line includes the DIALOG keyword and the dialog box name (OPENONE, in this example). There is one row for each control, including the title bar. The first nine columns contain information about each control's position, size, type (combo-box, button, and so forth), and custom text. The tenth column is reserved for initial values, and the eleventh column is used to store user replies.

Note in Figure 3 that the tenth column in the combo-box row (the fourth row of the DIALOG statement) contains FILENAMES. This is the name of a range immediately above the OPENONE dialog-box range that lists the full path names of the four files from which a user can choose. When-

ever your custom dialog box contains a combo- or list-box control, you must edit the resulting table to reference a range containing the items you want to display in the combo- or list-box.

The final step in the process of designing and managing a dialog box is to reference the dialog box range from your macro code with this command:

```
{DIALOG <<C:\SALES\APPTRY1>>OPENONE}
```

This command takes a single argument, a range referencing the dialog-box table. Preceding the range name with the path and filename of the file containing the range allows users to invoke the dialog box from any other open worksheet file. This is a useful habit to get into when coding your macros, since Windows makes it easy to keep open multiple files.

Your macro subroutine must also know how to process user replies. 1-2-3 places values in the eleventh column of the dialog-box range. For instance, if the user exits the box by clicking the Cancel button, or by pressing Esc, 1-2-3 enters a 0 in one of the cells of the dialog-box range. If the user selects a file from the list and clicks OK, 1-2-3 enters the filename in another cell.

It's up to you to write macro code that examines the contents of these dialog-box cells and responds accordingly. For a good look at the complete macro code that makes up our sample application, download DIALOG.ZIP from PC MagNet's Programming Forum. (For more information about how to participate in PC MagNet, which is just one of many ZiffNet services, see the sidebar "Guide to

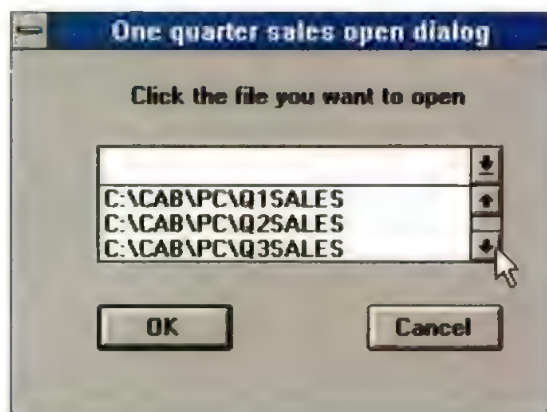


Figure 1: This dialog box lets users select a single quarter's worth of sales records.

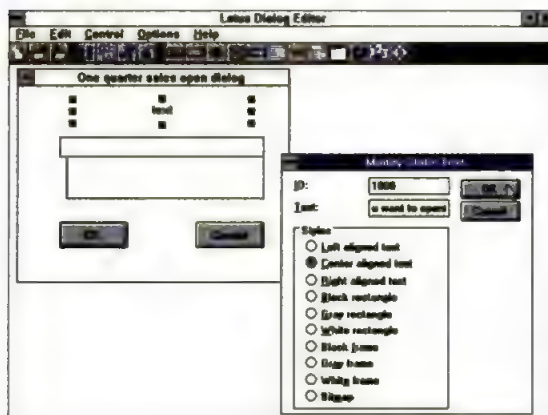


Figure 2: The Lotus Dialog Editor makes it easy to create dialog boxes graphically, by adding and positioning standard elements such as this static text message.

A	B	C	D	E	F	G	H
FILENAMES							
C:\SALES\Q1SALES							
C:\SALES\Q2SALES							
C:\SALES\Q3SALES							
C:\SALES\Q4SALES							
DIALOG	OPENONE						
-2.13E+09	4	70	55	160	115	**	**
36	10	100	10	1000	1342177281	"static"	"Click the file to open"
25	30	120	40	9500	1344274443	"combobox"	**
25	80	40	15	1	1342373889	"button"	"OK"
105	80	40	15	2	1342373888	"button"	"Cancel"
END DIALOG							

Figure 3: The dialog-box table for presenting and processing the dialog box in Figure 1. Note that each control in a dialog box corresponds to one line of the dialog-box table.

Our Utilities & How to Get Them" that appears in the Utilities column.)

A SECOND DIALOG BOX Now that you understand the basics of how dialog boxes work, let's look at a different type of dialog box—this time, one that lets a user select sales from two or more quarters for analysis (Figure 4). Instead of showing a list of files, this dialog box initially displays four blank check boxes—one for each quarter of the year. Multiple check boxes are appropriate for this type of selection, since a user can select two or more boxes. As with the first dialog box, you can use the Lotus Dialog Editor to design this type of dialog box.

Like the OPENONE dialog box, the OPENMANY dialog box is described by a table range. After a user clicks OK, 1-2-3 enters a 1 in column K for each check box that a user selected. 1-2-3 enters a 0 in column K when a check box

is left blank.

Figure 5 shows the macro code to present and process this dialog box. After the user closes the dialog box, TWOPLUS counts the number of checked boxes. It does this with a FOR loop that calls the SUMER subroutine once for each check box. On each pass through the loop, SUMER adds the value in column K for a check box (either 0 or 1) into the CHECKS range. After all four passes, the value in CHECKS equals the total number of checked boxes. If appropriate, TWOPLUS issues a warning (from its fifth line) when a user selects fewer than two files.

TWOPLUS also builds a combined sales database of those quarters selected by the user. The OPENER subroutine, called from TWOPLUS's tenth line, performs this task. The entry in column K for a check box determines how OPENER responds. Those check-box rows with a 0 in column K cause OPENER to return control immediately to TWOPLUS. Check boxes with a 1 in column K cause the corresponding quarter to become a part of the combined sales database. (OPENER deletes the header row of the second and all subsequent sales tables when appending them to the combined database).

There is additional code (not shown in Figure 5) for copying the combined database to a temporary file. The menu (described below) contains items for processing this file or the single data file opened with the dialog box shown in Figure 1.

Because TWOPLUS can take a long time to execute its tasks, it's a good idea to use the INDICATE command to remind the user to be patient. The routine uses this command twice. On the sixth line, the command replaces the 1-2-3 application title bar with a mes-

sage requesting patience. TWOPLUS invokes INDICATE again just prior to concluding (not shown in Figure 5). On this second occurrence, INDICATE takes no argument and it restores the normal application title bar.

BUILDING CUSTOM MENUS After designing and coding one or more dialog boxes, you can provide access to them with a custom menu. 1-2-3, Release 4.0, lets you integrate your custom menu into 1-2-3 by letting you display it on the default menu bar.

Figure 6 shows the custom menu. The first and second menu options invoke the two dialog boxes described above. The next three options invoke routines that process the sales records selected with either of the first two options. The next-to-last option switches to the first worksheet in the application filer, and the Remove option clears the custom menu and restores the default 1-2-3 menu bar.

There are three key concepts you need to master to construct custom menus: the MENU-INSERT command, the menu-description range, and the pull-down-menu-description range. The MENU-INSERT command invokes the custom menu by referencing the menu-description range, which specifies the appearance of the custom menu. The last row in the menu-description range points to the pull-down-menu-description range, which names, describes, and enables each custom-menu option. Enter the information directly in these ranges, according to the format described below.

The MENU-INSERT command requires the name of the menu-description

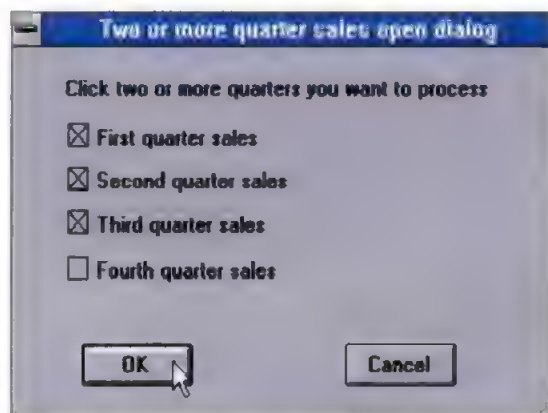


Figure 4: This dialog box lets users aggregate two or more quarters' worth of sales records. In this view, the user has selected the first, second, and third quarters for analysis.

Macro Code for OPENMANY Dialog Box

Partial Listing

```

TWOPLUS      {OFF}{LET <<C:\SALES\APPTRY1>>CHECKS;0}
              {DIALOG <<C:\SALES\APPTRY1>>OPENMANY}
              {FOR <<C:\SALES\APPTRY1>>ROWINDEX;2;5;1;<<C:\SALES\APPTRY1>>SUMER}
              {IF @INDEX(<<C:\SALES\APPTRY1>>OPENMANY;10;1)=0}{QUIT}
              {IF <<C:\SALES\APPTRY1>>CHECKS<2}{BRANCH <<C:\SALES\APPTRY1>>REMINDR1}
              {INDICATE "PROCESSING; PLEASE BE PATIENT."}
              {SELECT <<C:\SALES\APPTRY1>>SALES DATA:A3}
              {IF @CELLPOINTER("TYPE")<>"b"/re{END}{HOME} ~
              {LET FIRST;"NO"}
              {FOR ROWINDEX;2;5;1;OPENER}
SUMER         {LET <<C:\SALES\APPTRY1>>CHECKS;<<C:\SALES\APPTRY1>>CHECKS+@INDEX(<<C:\SALES\APPTRY1>>OPENMANY;10;<<C:\
              SALES\APPTRY1>>ROWINDEX)}
REMINDR1     {ALERT <<C:\SALES\APPTRY1>>MESS1;1;note}
OPENER       {IF @INDEX(<<C:\SALES\APPTRY1>>OPENMANY;10;<<C:\SALES\APPTRY1>>ROWINDEX)<>1}{RETURN}
              {LET <<C:\SALES\APPTRY1>>FILENAME;@INDEX(<<C:\SALES\APPTRY1>>FILENAMES;0;<<C:\SALES\APPTRY1>>ROWINDEX-
              2)} ~
              {FILE-COMBINE "REPLACE";<<C:\SALES\APPTRY1>>FILENAME;;"DATABASE"}
              {IF <<C:\SALES\APPTRY1>>FIRST="YES"}{DELETE-ROWS}
              {END}{D 2}
              {LET <<C:\SALES\APPTRY1>>FIRST;"YES"}
    
```

Figure 5: This listing shows the macro code used to present and process the OPENMANY dialog box.

range as an argument, and it can take an optional menu-index argument, an integer that designates where to put your custom menu on the default 1-2-3 menu bar.

In most cases, you'll want your custom menu to appear automatically after a user opens a 1-2-3 file. Include a MENU-INSERT command in the autoexecute macro to achieve this.

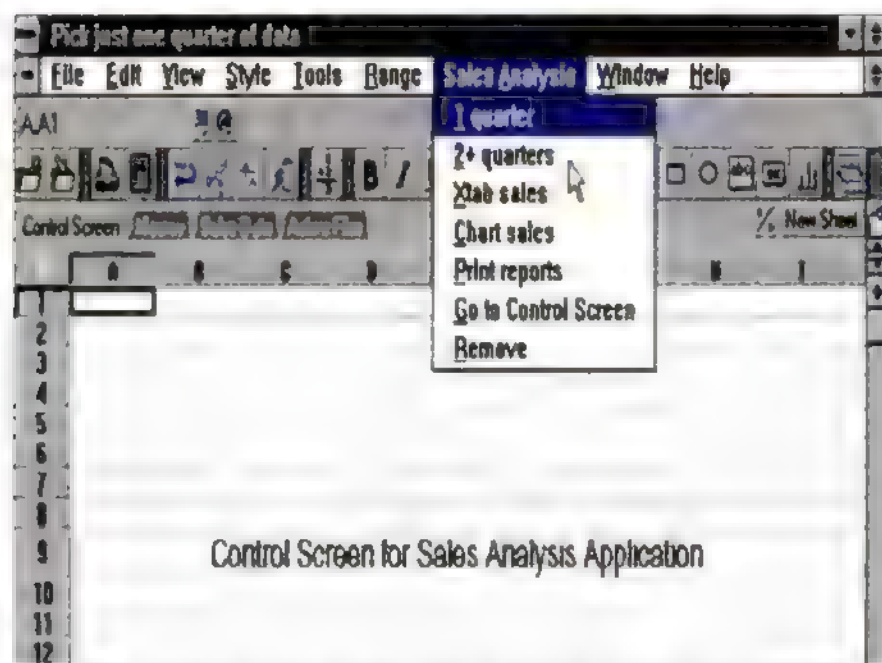


Figure 6: Custom menus allow easy access to your macro applications. It's best to put custom menus to the right, since most users expect the File and Edit menus to be on the left.

A menu-index value of 1 makes the custom menu the first one on the menu bar. Omitting the optional argument puts your custom menu just before the Window menu.

Next, create the menu-description range four rows deep in a single column. Type the name of your custom menu on the first row—just the way you want the name to appear on the 1-2-3 menu bar. You can make any character a hotkey for starting the menu by putting an ampersand before

it. The row below the menu name contains text for describing the menu when a user highlights the option. Enter @NA in the third row to dim a custom-menu option (Windows uses this to signal that an option is unavailable). The final row points to the pull-down-menu-description range—in this case, ANALCOMS:

```
(MENU-INSERT <<C:\SALES\
APPTRY1>>SALES_ANALYSIS)
```

This line of the sample application's autoexecute macro (namely, \0) contains a MENU-INSERT command that references SALES_ANALYSIS, the menu-description range. Since there is no menu-index argument, the custom menu appears just before the Window entry on the default menu bar.

For each menu option, there are five rows in the pull-down-menu-description range (Figure 7). The first is the option's name as it appears on the menu itself (again, with ampersands indicating hotkeys). The second line contains the menu description that appears when the option is highlighted. In this sample application, the second row in ANALCOMS contains formulas that point to other cells with the text. This indirect reference technique makes the descriptions easier to proof-read and change. The third row is used

```

Sales &Analysis
Analyze quarterly sales data

ANALCOMS
    
```

For each menu option, there are five rows in the pull-down-menu-description range (Figure 7). The first is the option's name as it appears on the menu itself (again, with ampersands indicating hotkeys). The second line contains the menu description that appears when the option is highlighted. In this sample application, the second row in ANALCOMS contains formulas that point to other cells with the text. This indirect reference technique makes the descriptions easier to proof-read and change. The third row is used

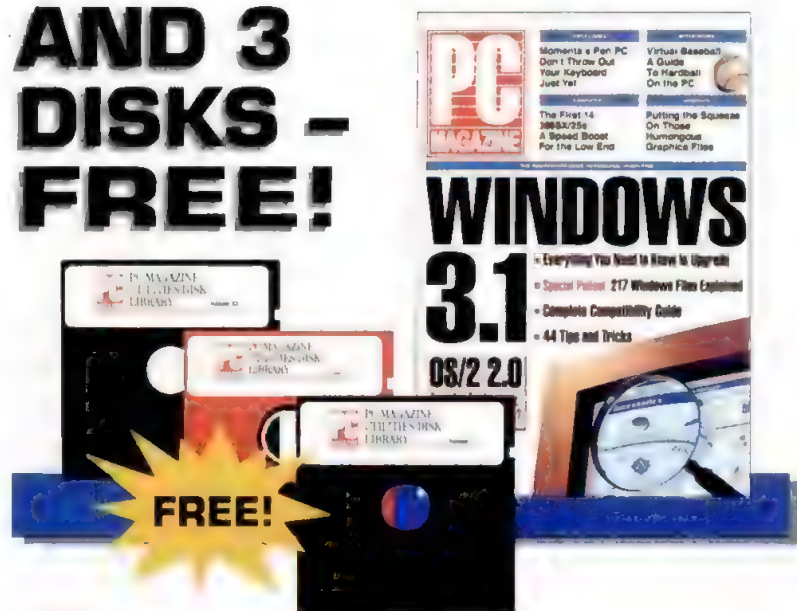
APPTRY1.WK4

A	B	C	D	E	F	G	H
ANALCOMS	&1 quarter	&2+ quarters	&Xtab sales	&Chart sales	&Print reports	&Go to Control Screen	&Remove
	+DESC1	+DESC2	+DESC3	+DESC4	+DESC5	+DESC6	+DESC7
	{ONE}	{TWOPLUS}	{XTABIT}	{DO_CHARTS}	{PRINT_EM}	{TO_HOME}	{MENU-RESET}

Figure 7: This table contains information about the custom menu—the option's name, the menu description, the dim option, and either the start of the code or a reference to where the macro code starts.

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to dim the option, if necessary (I didn't use this in the example). The fourth row must be blank, but the 1-2-3 documentation offers no reason why.

The fifth row of the pull-down-menu-description range contains either the start of the code to enable the option or a reference to code that implements the menu option. If an option requires only one or two lines of macro code, it is best to start the code in this cell. More complex tasks should be encapsulated in subroutines. For example, the first and second menu options call the ONE and TWOPLUS subroutines, respectively.

Once a MENU-INSERT command places a custom menu on the menu bar, it stays there until a MENU-RESET command restores the default menu bar. It's a good idea to put this command in the last option on your custom menus. This lets users close the custom application and return to a default 1-2-3 configuration whenever they prefer. The MENU-RESET command should also be among those executed in the exit routine for a macro application with a custom menu.

CONCLUSION This article presents just a sample of the user interface tools that 1-2-3, Release 4.0, provides to make your applications look better. The full set of tools allows even more options. For example, you can enhance dialog boxes with bitmapped images on buttons to suggest their function and improve their appearance. If you're worried about users inadvertently viewing sensitive information or corrupting source code, you can use dialog boxes, on-sheet macro buttons, custom menus, and macros to eliminate the default menu bar, scroll bars, and SmartIcons. With these steps, you can create a tightly controlled environment in which users can respond only through custom menus, dialog boxes, and macro buttons.

Except for the fact that your macro applications must run from inside 1-2-3, it's possible to build macro applications that look and feel just like Windows applications. The possibilities are limited only by your imagination. □

RICK DOBSON IS A COMPUTER CONSULTANT AND CONTRIBUTOR TO SEVERAL BOOKS INCLUDING *USING 1-2-3 FOR WINDOWS* AND *1-2-3 POWER MACROS*.

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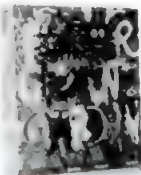


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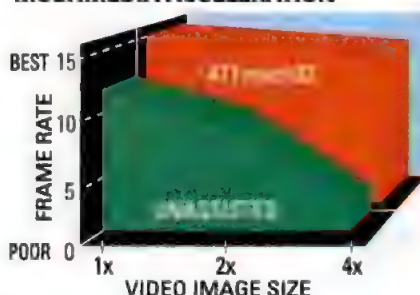
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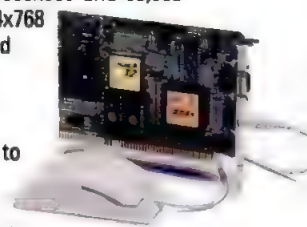
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Toolkits

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ONLY MINOR DISAPPOINTMENTS As with most products, CommLib Professional does contain a few minor disappointments. The most technical disappointment is that the DOS library is not reentrant. Although it is unlikely that you would use the reentrant attribute under DOS, it also means the code would be harder to port to a multitasking environment, such as OS/2, or use when coding a TSR.

Also, a few desirable features are not included with the package. For instance, there is no terminal-emulation support included. If you want to support ANSI control sequences or emulate a VT100 terminal, you have to provide the code yourself. Also excluded is the popular CompuServe B+ protocol, the fastest available when you're retrieving files from that service.

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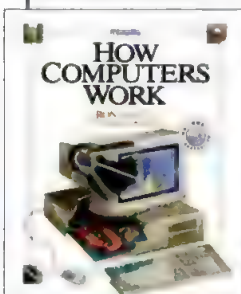
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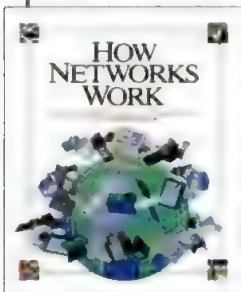
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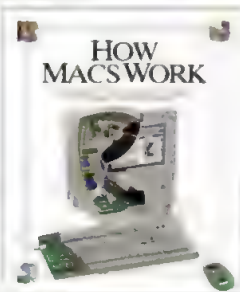
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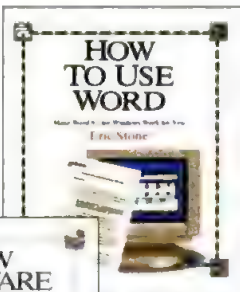
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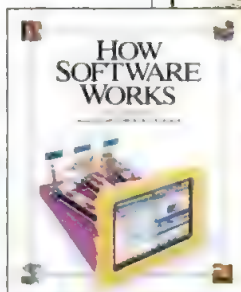
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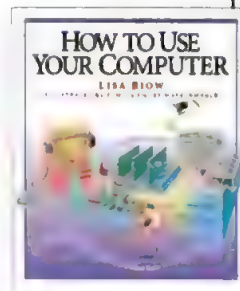
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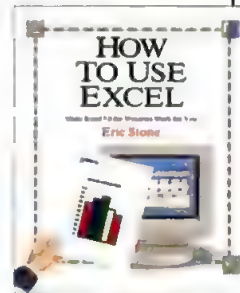
ISBN: 133-1 Price: \$24.95



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Environments

BY CHARLES PETZOLD

Brush Up on Your Brushes

At one time, the Windows Graphics Device Interface (GDI) had a simple, straightforward, one-to-one correspondence between graphics primitives (lines, filled areas, text) and the GDI objects used to render these primitives. When drawing lines, for example, you would use the GDI object known as the pen. The pen determined the appearance of the line—its color, its width, and whether it's solid or composed of various dots and dashes. When drawing filled areas, you'd use a brush (sometimes also called a pattern). When drawing text, you'd use a font.

With Windows NT, however, enhancements to GDI have begun to blur the clear divisions between these primitives and GDI objects. In particular, we've seen that one of the parameters to the `ExtCreatePen()` function in Windows NT is a pointer to a `LOGBRUSH` (logical brush) structure normally used to define a brush.

At first, this seems a bit jolting, but it actually makes a lot of sense: When you draw wide lines, the interior of the line is really more like an area, so we should have a similar flexibility in determining how this interior appears.

In the last column, our exploration of `ExtCreatePen()` was restricted to simple solid-color brushes. Now it's time to take full advantage of the Windows NT enhancements. This requires becoming familiar with brush creation and brushing up on our knowledge of brushes.

CREATING A BRUSH Windows NT includes no fewer than six functions for creating brushes. The first five functions create brushes of various types. They are

- `CreateSolidBrush()`,

- `CreateHatchBrush()`,
- `CreatePatternBrush()`,
- `CreateDibPatternBrush()`, and
- `CreateDibPatternBrushPt()`.

(The Pt suffix on the last function stands for pointer.) These are handy functions if you prefer to define brushes with function parameters rather than mess around with a data structure. But the functionality of all five of these functions is encapsulated in the sixth function, called `CreateBrushIndirect()`. The single parameter is a pointer to a `LOGBRUSH` structure, which has three fields:

```
typedef structure tagLOGBRUSH
{
    UINT lbStyle;
    COLORREF lbColor;
    LONG lbHatch;
}
LOGBRUSH;
```

If you're like me and you try reading the documentation of this structure in the *Microsoft Win32 Programmer's Reference*, you'll probably become totally con-

fused by how the second two structure fields relate to the first field. You'll find it much easier to look at the chart shown in Figure 1.

The `lbStyle` field can be any one of seven constants beginning with the prefix BS (brush style). With the exception of the `BS_NULL` and `BS_HOLLOW` styles (which create an invisible brush), you can see how the other five styles correspond to the first five brush-creation functions listed above. (The Windows NT header files define three other brush styles: `BS_INDEXED`, `BS_PATTERN8X8`, and `BS_DIBPATTERN8X8`. These additional styles are not documented, though, and I haven't been able to get them to work.)

Depending on the `lbStyle` field, the other two fields are either ignored (as indicated by a dash) or take on various meanings. For a solid brush, for example, the `lbColor` field indicates the color used to fill the area. For the hatched brush (which looks like a series of vertical, horizontal, or diagonal hatch marks), the `lbColor` field determines the color of the hatch marks. The `lbHatch` field is used to specify the hatch style, which is an identifier beginning with the prefix HS. (We'll discuss these in more detail very shortly.)

You can also define a brush using a bitmap. This can be either a GDI bitmap object, in which case the third field of the `LOGBRUSH` structure is a handle to a bitmap, or a device-independent bitmap (DIB) stored in program memory in the packed-DIB format, in which case you set that third field of the structure to its memory handle or simply to a pointer.

In this case, the `lbColor` field can be either `DIB_RGB_COLORS` or `DIB_PAL_COLORS`, indicating whether the DIB color table is composed of explicit RGB colors or indices into a palette table. (If you need a refresher on GDI bitmap objects, device-independent bitmaps, and the packed-DIB format, look back at the columns of May through September 1991.)

THE BS_HATCHED STYLE Soon after I started programming for Windows 1.0 in 1985, I realized that the `WINDOWS.H` header file was an important part of system

The Fields of the LOGBRUSH Structure

lbStyle	lbColor	lbHatch
BS_SOLID	Brush color	---
BS_NULL	---	---
BS_HOLLOW	---	---
BS_HATCHED	Hatch color	HS_constant
BS_PATTERN	---	Bitmap handle
BS_DIBPATTERN	DIB_constant	Handle to packed-DIB
BS_DIBPATTERNPT	DIB_constant	Pointer to packed-DIB

Figure 1: This shows the three fields of the `LOGBRUSH` structure, a pointer to which is the single parameter of the `CreateBrushIndirect()` function.

HATCHES.C

Complete Listing

```

/*-----
HATCHES.C -- Windows NT Hatch Patterns
(c) Charles Petzold, 1994
-----*/

#include <windows.h>
#include <string.h>

char szClass [] = "Hatches" ;
char szTitle [] = "Hatches: Windows NT Hatch Patterns" ;

void PaintRoutine (HWND hwnd, HDC hdc, int cxArea, int cyArea)
{
    static struct
    {
        int iIdent ;
        char * cLabel ;
    }
    hatches [] = { HS_HORIZONTAL, "HS_HORIZONTAL",
                   HS_VERTICAL, "HS_VERTICAL",
                   HS_FDIAGONAL, "HS_FDIAGONAL",
                   HS_BDIAGONAL, "HS_BDIAGONAL",
                   HS_CROSS, "HS_CROSS",
                   HS_DIAGCROSS, "HS_DIAGCROSS",
                   HS_FDIAGONAL1, "HS_FDIAGONAL1",
                   HS_BDIAGONAL1, "HS_BDIAGONAL1",
                   HS_SOLID, "HS_SOLID",
                   HS_DENSE1, "HS_DENSE1",
                   HS_DENSE2, "HS_DENSE2",
                   HS_DENSE3, "HS_DENSE3",
                   HS_DENSE4, "HS_DENSE4",
                   HS_DENSE5, "HS_DENSE5",
                   HS_DENSE6, "HS_DENSE6",
                   HS_DENSE7, "HS_DENSE7",
                   HS_DENSE8, "HS_DENSE8",
                   HS_NOSHADE, "HS_NOSHADE",
                   HS_HALFTONE, "HS_HALFTONE",
                   HS_SOLIDCLR, "HS_SOLIDCLR",
                   HS_DITHEREDCLR, "HS_DITHEREDCLR",
                   HS_SOLIDTEXTCLR, "HS_SOLIDTEXTCLR",
                   HS_DITHEREDTEXTCLR, "HS_DITHEREDTEXTCLR",
                   HS_SOLIDBKCLR, "HS_SOLIDBKCLR",
                   HS_DITHEREDBKCLR, "HS_DITHEREDBKCLR" } ;

    int i, x, y, cxChar, cyChar ;
    LOGBRUSH lb ;
    TEXTMETRIC tm ;

    GetTextMetrics (hdc, &tm) ;

    cxChar = tm.tmAveCharWidth ;
    cyChar = tm.tmHeight ;

    SelectObject (hdc, GetStockObject (NULL_PEN)) ;

    for (i = 0 ; i < 25 ; i++)
    {
        x = cxChar * (1 + 40 * (i > 12)) ;
        y = cyChar * (1 + 2 * (i % 13)) ;

        TextOut (hdc, x, y, hatches[i].cLabel,
                strlen (hatches[i].cLabel)) ;

        x += 24 * cxChar ;

        SetTextColor (hdc, RGB (255, 32, 32)) ;
        SetBkColor (hdc, RGB (32, 255, 32)) ;

        lb.lbStyle = BS_HATCHED ;
        lb.lbColor = RGB (32, 32, 255) ;
        lb.lbHatch = hatches[i].iIdent ;

        SelectObject (hdc, CreateBrushIndirect (&lb)) ;

        Rectangle (hdc, x, y, x + 8 * cxChar, y + cyChar) ;

        SetTextColor (hdc, RGB (0, 0, 0)) ;
        SetBkColor (hdc, RGB (255, 255, 255)) ;

        DeleteObject (SelectObject (hdc, GetStockObject
        (WHITE_BRUSH))) ;
    }
}

```



Figure 2: HATCHES.C illustrates the 25 hatch styles available under Windows NT.

documentation. Things are defined in the header file that do not appear in the documentation. (Some people attribute this to deviousness on Microsoft's part; I tend to regard it more as laziness.) When you create a hatched brush under Windows 3.1, you have only six hatch styles available, indicated by identifiers beginning with the prefix HS. Although only these six hatch styles are listed in the Windows NT documentation, the NT header files define 19 more, for a total of 25. Moreover, they work!

So before we start drawing lines using hatch-pattern pens, let's take a look at these new hatch styles. The HATCHES program is shown in Figure 2. This program as well as the others in this column require the NTGDI files shown in the January 11, 1994 Environments column. Or you can download all the files from PC MagNet's Programming Forum archived as BRUSH.ZIP.

HATCHES is a fairly simple program. For all 25 hatch styles, the program displays a label with the hatch style identifier, creates a hatched brush using that

style, and then draws a rectangle. You'll notice that the program also sets three colors before drawing these rectangles. The text color is set using SetTextColor() to RGB(255,32,32), which is almost pure red. The background color is set using SetBkColor() to RGB(32,255,32), which is almost pure green. The hatch color is set using the lbColor field of the LOGBRUSH structure to RGB (32,32,255), which is almost pure blue. The results are shown in the top-left screen of the visual sidebar "Windows NT Brush Styles."

The first six brushes in the left column are those supported under Windows 3.1. It may be hard to tell, but those are blue hatch lines against a green background, which is what we expect. GDI converts the hatch color and the background color to the nearest pure colors available on the device. Next, we have two additional diagonal hatch styles; the hatch lines are closer together than the earlier diagonal styles. The HS_SOLID style is pure blue. Then there are eight brush styles with various densities of blue against green. The OS/2 Graphics Programming Inter-

face (GPI) also defines a collection of brush styles with various densities, but they look a little different. In short, GPI uses dithering patterns, while GDI does something closer to halftoning.

Dithering is common on video displays to create new colors that are not available otherwise. Pixels of different colors actually available on the display are arranged in a pattern. For example, cyan can be simulated by alternating blue and green pixels both horizontally and vertically. Dithering does not work well in printing because the ink of individual pixels tends to spread out. Instead, halftoning is used. Various shades of a primary color can be simulated by drawing larger or smaller dots of that color. Look at newspaper photographs or color comic strips with a magnifying glass to see how this works. The halftoning used in printing is definitely not the same as the HS_HALFTONE style. The HS_HALFTONE style alternates blue and green pixels in a dithering pattern.

The last six styles display the hatch

HATCHPEN.C

Complete Listing

```

/*-----
HATCHPEN.C -- Hatched Pen Demo
(c) Charles Petzold, 1994
-----*/

#include <windows.h>

char szClass [] = "HatchPen" ;
char szTitle [] = "HatchPen: Hatched Pen Demo" ;

void PaintRoutine (HWND hwnd, HDC hdc, int cxArea, int cyArea)
{
    LOGBRUSH lb ;

    SetMapMode (hdc, MM_ANISOTROPIC) ;
    SetWindowExtEx (hdc, 100, 100, NULL) ;
    SetViewportExtEx (hdc, cxArea, cyArea, NULL) ;

    SetBkColor (hdc, RGB (0, 0, 255)) ;

    lb.lbStyle = BS_HATCHED ;
    lb.lbColor = RGB (255, 0, 0) ;
    lb.lbHatch = HS_DENSE3 ;

    SelectObject (hdc,
        ExtCreatePen (PS_GEOMETRIC | PS_SOLID, 25, &lb, 0, NULL)) ;

    Ellipse (hdc, 25, 25, 75, 75) ;

    DeleteObject (
        SelectObject (hdc,
            GetStockObject (BLACK_PEN))) ;
}

```



Figure 3: HATCHPEN.C draws an ellipse using a pen with a hatched brush style.

BMPPEN.C

Complete Listing

```

/*-----
BMPPEN.C -- Bitmap Pen Demo
(c) Charles Petzold, 1994
-----*/

#define OEMRESOURCE
#include <windows.h>

char szClass [] = "BmpPen" ;
char szTitle [] = "BmpPen: Bitmap Pen Demo" ;

void PaintRoutine (HWND hwnd, HDC hdc, int cxArea, int cyArea)
{
    HBITMAP hbm ;
    LOGBRUSH lb ;

    SetMapMode (hdc, MM_ANISOTROPIC) ;
    SetWindowExtEx (hdc, 100, 100, NULL) ;
    SetViewportExtEx (hdc, cxArea, cyArea, NULL) ;

    hbm = LoadBitmap (NULL, (PSTR) OBM_CLOSE) ;

    lb.lbStyle = BS_PATTERN ;
    lb.lbColor = 0 ;
    lb.lbHatch = (LONG) hbm ;

    SelectObject (hdc,
        ExtCreatePen (PS_GEOMETRIC | PS_SOLID, 25, &lb, 0, NULL)) ;

    Ellipse (hdc, 25, 25, 75, 75) ;

    DeleteObject (
        SelectObject (hdc,
            GetStockObject (BLACK_PEN))) ;

    DeleteObject (hbm) ;
}

```



Figure 4: BMPPEN.C draws an ellipse using a pen with a system bitmap brush.

color, text color, and background color, either solid (that is, nearest pure color) or dithered. Normally, the text color isn't used at all when drawing brushes, but here it is. Notice that the HS_SOLID style is the same as HS_SOLIDCLR, that HS_NOSHADOW is the same as HS_SOLIDBKCLR, and that the last six styles can be duplicated using the BS_SOLID style, with or without GetNearestColor().

So we really have only 11 new hatch styles that weren't available before through other means. These are the two new diagonal styles, the eight HS_DENSE styles, and HS_HALFTONE.

PENS AND HATCHED BRUSHES Let's create a pen using a hatched brush. The HATCHPEN program is shown in Figure 3. The program sets the background color to blue and sets up a LOGBRUSH structure for a red HS_DENSE3 hatched brush. A pointer to this structure is passed as the third parameter to

ExtCreatePen(), which creates a solid geometric pen with a width of 25 units. The results are shown in the top-right screen of the sidebar.

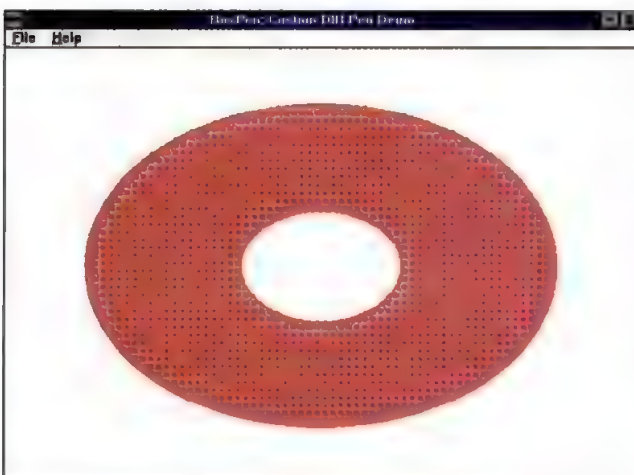
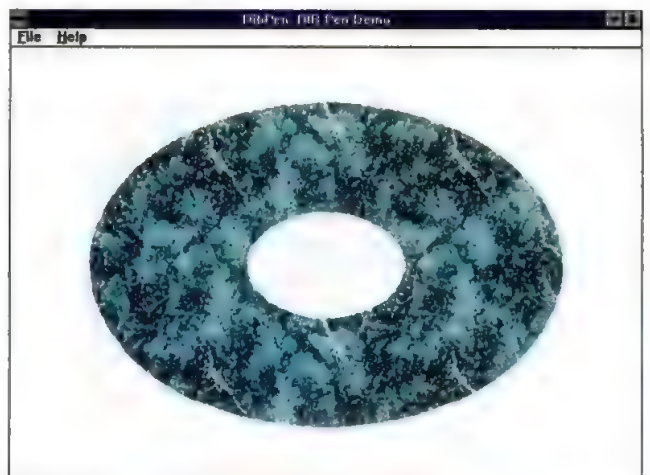
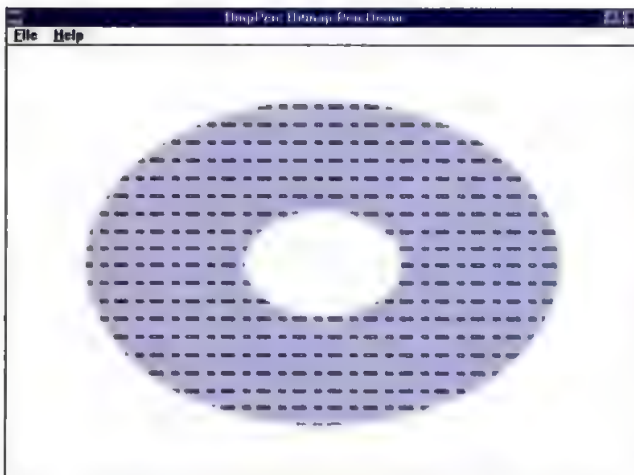
You may want to change the PS_SOLID identifier in ExtCreatePen() to PS_DOT, recompile, and run the program. You'll see something quite odd: four big dots, two of which overlap, sitting on the circumference of the ellipse. Although I didn't make this clear in the last issue, the pens created by ExtCreatePen() do *not* use the background color for the spaces between dotted and dashed pen styles. Also, as I *did* make clear, the dots and dashes of styled pens become longer with wider pen widths. That's why the pen becomes a series of big dots. It looks strange at first view, but it's perfectly reasonable.

PENS AND BITMAPS If you're not satisfied with the various hatch styles available, you can define your own brush style using GDI bitmap objects or device-inde-

pendent bitmaps. The BMPPEN program shown in Figure 4 obtains a system bitmap using the LoadBitmap() function and uses that for the brush. The system bitmaps are those that Windows uses to draw the system menu box, the minimize and maximize boxes, the scroll bar arrows, the check boxes, and so forth. The BMPPEN program uses LoadBitmap() to get the OBM_CLOSE system bitmap, which is the bitmap image of both the large and small close boxes that appear at the upper-left corner of windows. The lbStyle field of the LOGBRUSH structure is set to BS_PATTERN, and the lbHatch field is set to the bitmap handle. ExtCreatePen() creates a solid geometric pen using this structure.

The program then draws an ellipse, exactly as in the HATCHPEN program. The results are shown in the middle-left screen of the visual sidebar. The bitmap is simply repeated horizontally and vertically within the area of the wide pen.

■ Windows NT Brush Styles



The HATCHES display (A) shows the 25 hatch styles available under Windows NT. The HATCHPEN display (B) shows an ellipse drawn with pen using a hatched brush style. The BMPPEN display (C) shows a pen composed of the close system bitmaps. The DIBPEN display (D) shows a pen composed of the MARBLE.BMP pattern. The BOXPEN display (E) shows a pen composed of an 8-by-8 DIB with a box pattern.

DIBPEN.C

Complete Listing

```

/*-----
DIBPEN.C -- DIB Pen Demo
(c) Charles Petzold, 1994
-----*/

#include <windows.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

char szClass [] = "DibPen" ;
char szTitle [] = "DibPen: DIB Pen Demo" ;

PVOID LoadDib (PSZ szFilename)
{
    BITMAPFILEHEADER bmfh ;
    FILE * file ;
    PVOID pDib ;

    if (NULL == (file = fopen (szFilename, "rb")))
        return NULL ;

    fread (&bmfh, sizeof (BITMAPFILEHEADER), 1, file) ;
    bmfh.bfSize -= sizeof (BITMAPFILEHEADER) ;

    if (NULL == (pDib = malloc (bmfh.bfSize)))
    {
        fclose (file) ;
        return NULL ;
    }

    fread (pDib, bmfh.bfSize, 1, file) ;
    fclose (file) ;

    return pDib ;
}

void PaintRoutine (HWND hwnd, HDC hdc, int cxArea, int cyArea)
{
    char szFilename [MAX_PATH] ;
    LOGBRUSH lb ;
    PVOID pDib ;

    GetWindowsDirectory (szFilename, MAX_PATH) ;

    strcat (szFilename, "\\") ;
    strcat (szFilename, "marble.bmp") ;

    if (NULL == (pDib = LoadDib (szFilename)))
    {
        MessageBeep (0) ;
        return ;
    }

    SetMapMode (hdc, MM_ANISOTROPIC) ;
    SetWindowExtEx (hdc, 100, 100, NULL) ;
    SetViewportExtEx (hdc, cxArea, cyArea, NULL) ;

    lb.lbStyle = BS_DIBPATTERNPT ;
    lb.lbColor = DIB_RGB_COLORS ;
    lb.lbHatch = (LONG) pDib ;

    SelectObject (hdc,
        ExtCreatePen (PS_GEOMETRIC | PS_SOLID, 25, &lb, 0, NULL)) ;

    Ellipse (hdc, 25, 25, 75, 75) ;

    DeleteObject (
        SelectObject (hdc,
            GetStockObject (BLACK_PEN))) ;

    free (pDib) ;
}

```



Figure 5: DIBPEN.C draws an ellipse using a pen with a DIB-based brush.

BOXPEN.C

Complete Listing

```

/*-----
BOXPEN.C -- Custom DIB Pen Demo
(c) Charles Petzold, 1994
-----*/

#include <windows.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

char szClass [] = "BoxPen" ;
char szTitle [] = "BoxPen: Custom DIB Pen Demo" ;

void PaintRoutine (HWND hwnd, HDC hdc, int cxArea, int cyArea)
{
    static struct
    {
        BITMAPINFOHEADER bminh ;
        RGBQUAD rgbq [2] ;
        BYTE bBits [8] [4] ;
    }
    dib = { sizeof (
        BITMAPINFOHEADER), 8, 8, 1, 1, 0, 0, 0, 0, 0, 0,
        0xFF, 0x00, 0x00, 0x00, 0x00, 0x00, 0xFF, 0x00,
        0xFF, 0x00, 0x00, 0x00,
        0xFF, 0x00, 0x00, 0x00 } ;

    LOGBRUSH lb ;

    SetMapMode (hdc, MM_ANISOTROPIC) ;
    SetWindowExtEx (hdc, 100, 100, NULL) ;
    SetViewportExtEx (hdc, cxArea, cyArea, NULL) ;

    lb.lbStyle = BS_DIBPATTERN ;
    lb.lbColor = DIB_RGB_COLORS ;
    lb.lbHatch = (LONG) &dib ;

    SelectObject (hdc,
        ExtCreatePen (PS_GEOMETRIC | PS_SOLID, 25, &lb, 0, NULL)) ;

    Ellipse (hdc, 25, 25, 75, 75) ;

    DeleteObject (
        SelectObject (hdc,
            GetStockObject (BLACK_PEN))) ;
}

```



Figure 6: BOXPEN.C draws an ellipse using a pen with an 8- by-8-pixel DIB-based brush.

The DIBPEN program shown in Figure 5 uses a DIB for the pen brush. Using a simple DIB loading function, DIBPEN loads the MARBLE.BMP file included with Windows NT into a block of memory. It sets the lbStyle field of the LOGBRUSH structure to BS_DIBPATTERNPT, the lbColor field to DIB_RGB_COLORS, and the lbHatch

field to a pointer to the memory block containing the packed DIB. The results are shown in the middle-right screen of the visual sidebar.

If you've worked with bitmap or DIB brushes under Windows 3.1, you'll recall that they are limited to an 8-pixel by 8-pixel fill pattern. If the bitmap is larger, GDI will use only the upper-left 8-by-8

corner. As you can see, Windows NT removes this restriction. (However, I couldn't get the BS_DIBPATTERNPT style to work with a couple DIBs I have around, all of which share the characteristic of being larger than 64K in size. Could it be that the Windows NT GDI still has remnants of 16-bit code?)

In either case, the bitmap is aligned



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with the upper-left corner of the client area. That is, imagine if the bitmap were first displayed with the upper-left corner of the image at the upper-left corner of the client area. Then repeat the bitmap image going across and down and in between. Now take away everything that is not part of the interior of the line. That's what you'll see on the screen.

There's a problem with using bitmap brushes on different output devices. Although the appearances of the predefined hatch patterns are defined by the device driver as being appropriate for the resolution of the device, you'll have to stretch out bitmaps before using them on a laser printer.

***Under Windows 3.1,
bitmap or DIB
brushes are limited
to an 8-pixel by
8-pixel fill pattern.
Windows NT removes
this restriction.***

THE 8-BY-8 DIB Although you're not restricted to 8-by-8 DIB patterns any more, it's still a useful size for video displays. Moreover, they're easy to create right in static program memory. This is illustrated by the BOXPEN program shown in Figure 6. The program defines a structure named dib that contains an 8-by-8 monochrome packed DIB with a pattern that looks like a little blue 4-by-4 box in a field of red. By now you should be familiar with the rest of the listing. The results are shown in the bottom-left screen of the visual sidebar "Windows NT Brush Styles."

By the way, the *Win32 Programmer's Reference* documentation for `CreateDIBPatternBrush()` indicates that the color table in a monochrome DIB will be ignored, and instead GDI will use the current foreground and background colors. That's not true, as should be obvious from this screen shot. □

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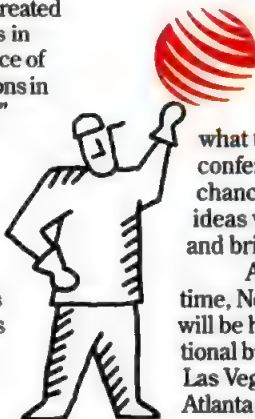
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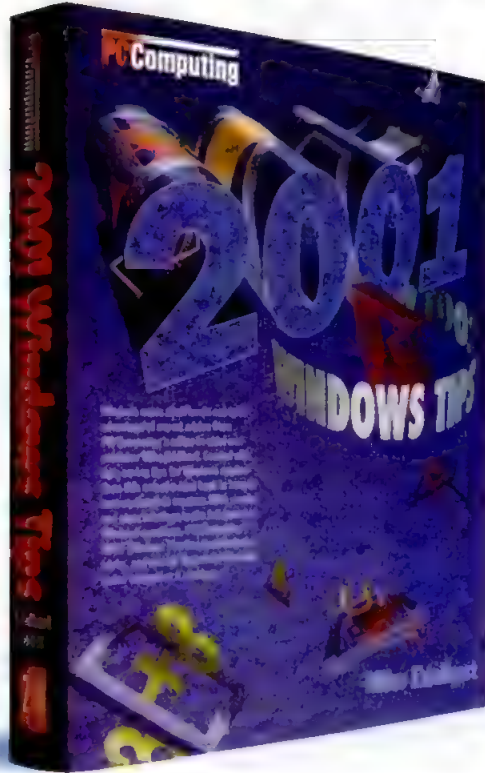
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Power Programming

BY KAARE CHRISTIAN

C++ Application Frameworks

Two years ago I built a post-and-beam house in rural upstate New York. Before my arrival, my carpenter had shaped and fitted every beam, transforming rough-cut wood into a jigsaw-like set of parts ready to be erected.

Building a Windows application using an application framework is a similar process. You use a set of ready-made parts, which lets you get underway quickly. Because the parts are sturdy and robust, later work is simplified. But more importantly, whether you use a framework of beams for a house or an application framework for a Windows program, there's a paradigm shift, a whole new way of doing things. In my post-and-beam house, the paradigm shift wasn't always a help; tradesmen had trouble adapting their skills to the pre-cut beams. And the same thing happens at first in Windows, because some of what you've learned about programming Windows in C doesn't carry over to using C++ and an application framework. Over time, the Windows-programming paradigm shift is a great boon: The framework takes care of message loops and other Windows drudgery, and it facilitates a more orderly program structure.

Application frameworks—C++ class libraries for building Windows applications—are now coming of age because object-oriented programming is rapidly gaining acceptance. The Windows API is procedural, but application frameworks let you write object-oriented Windows programs. They also provide prewritten functionality in the form of high-level classes that speed application development.

The two major application frame-

works are the Microsoft Foundation Class (MFC) library and Borland's Object Windows Library (OWL). There are related products from smaller companies that are designed expressly to provide application portability across several environments (UNIX, Windows, OS/2, Macintosh), but they have much less presence in the Windows market than OWL or MFC and aren't covered here.

FRAMEWORK PROS AND CONS Application frameworks provide numerous advantages. Probably the most important is their application of the object-oriented programming paradigm to Windows programming, which is inherently object-oriented. It is sensible and intuitive to use class derivation to state, "This new type of window is like this existing window, except for these few changes."

You can also use application frameworks to ease routine but complex chores. Current frameworks help with graphics, dialog boxes, printing, help, VBX controls, the Clipboard, and OLE (Object Linking and Embedding), and they can create toolbars and status bars. Future frameworks will supply increasingly capable OLE

2.0 support and other advanced features.

One of the latest developments in both OWL and MFC is their document-and-view architecture. Both libraries supply a generic document class from which you derive your own document class. In this context, a document is not just text but can be whatever you work with in your application—numbers, graphics, controls and gauges, equations, tables, and so on. Both frameworks also use a document template class that links a document object to views of that object in a window or on the printer. The document-and-view architecture separates your data from displays of that data, and it also makes having several different views of data easy.

Code written with the help of an application framework is often more cleanly organized, because the framework changes the way Windows messages are managed. Instead of routing messages via lengthy window procs with enormous switch statements, you use individual class member functions. The member functions replace the do-it-all tangle of code in most window procs with a set of

Application Framework Architecture

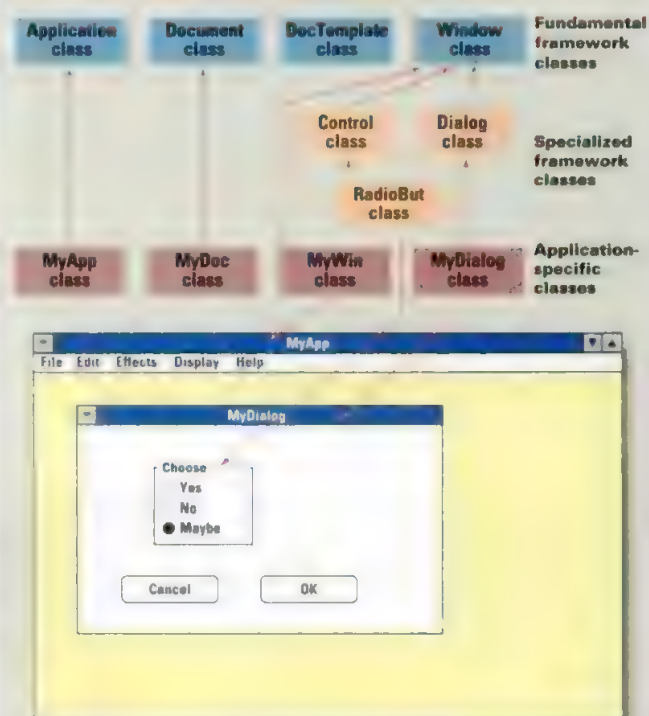


Figure 1: This diagram shows the architecture of Windows applications built using either the OWL or the MFC application framework.

special-purpose routines.

Application frameworks may someday help you maintain a single code base for multiple environments. OWL and MFC support both 16- and 32-bit versions of Windows, but support for environments outside the Windows family is just now emerging. Borland, in collaboration with Novell, recently announced OWL for AppWare, which promises to make OWL programs portable to UNIX, Macintosh, and OS/2. Beta testing will begin in mid-1994.

Finally, the latest versions of the Borland, Microsoft, and Symantec compilers all include code generators that use application frameworks to create skeleton applications. You must have a good working knowledge of the framework to modify the skeleton code, so it's not quite as easy to use as Visual Basic. But for application framework experts, the code generators can be a big time saver.

The primary disadvantage to using an application framework is that no single application framework is supported by all C++ compilers. So when you choose an application framework, you are—to some extent—choosing a compiler as

well.

MFC is currently supported by Microsoft Visual C++ and Symantec C++. Borland has a white paper describing how to modify MFC to work with Borland's compiler, but Borland doesn't supply MFC with its compiler—you must purchase MFC separately. OWL is currently supported by only the Borland compiler, but Borland representatives have hinted that this won't be the case much longer.

OWL'S FIRST FLIGHT Borland's Object Windows Library was originally built for Turbo Pascal for Windows and was released in March 1991. In September 1991, OWL was incorporated in Borland C++ with Application Frameworks, Version 2.0, and has been in wide use since that time. Version 2.0 of OWL is about to be released at the time of this writing.

OWL 1.0 had two major weaknesses. One was that it didn't incorporate Windows' Graphics Device Interface (GDI). Another weakness of OWL 1.0 was its reliance on a nonportable C++ language extension. The language extension adds a new syntax for declaring member functions so you can specify in the declaration which Windows message the function

handled. If this language extension had been picked up by other compiler vendors, then OWL programs would have been portable. But the extension is unique to Borland C++, which chains OWL 1.0 programs to Borland C++.

Even with these limitations, OWL 1.0 was a success. It introduced thousands of programmers to the application-framework paradigm, and it served as a useful model for later versions of application frameworks.

MFC 1.0 AND 2.0 Version 1.0 of the MFC library was released with Micro-

soft C/C++, Version 7.0, in March 1992. MFC 1.0 was similar in functionality to OWL 1.0. The most important difference was that it used message maps to route Windows messages to specific class member functions, thereby avoiding the C++ language extension that had dogged OWL 1.0. (Message maps will be discussed in more detail later in this article.)

MFC 1.0 wasn't a smashing success, primarily because it was supplied with Microsoft C/C++ 7.0, which suffered from a weak programming environment. But that difficulty was remedied in February 1993 when Microsoft released MFC 2.0 together with Visual C++, a groundbreaking software development system. Finally all the pieces were in place for success, which is exactly what happened.

MFC 2.0 is highly compatible with MFC 1.0, but it contains significant improvements. The most dramatic improvement is the document-and-view architecture, which helps you manage, display, and print your documents.

Another strength of MFC is that it is 32-bit ready. This makes MFC programs much easier to port to 32-bit Windows than most C applications, because MFC smooths over the differences between 16- and 32-bit code. MFC 2.0 also supports print preview, button bars, status lines, simple use of OLE, VBX controls, and context-sensitive help.

OWL REDUX OWL 2.0, scheduled for release in late 1993 together with Version 4.0 of Borland C++, is Borland's response to Microsoft's success with MFC 2.0. OWL 2.0 adds significant low-level functionality and supports the entire Windows API, including the GDI portion. Other new advantages include the use of message maps to connect messages to member functions, seamless operation in both 16- and 32-bit environments, support for toolbars and status bars, and a document-and-view architecture.

The price of these improvements is a loss of compatibility with OWL 1.0. People with OWL 1.0 code need to do a significant amount of work in order to move to OWL 2.0. The task is eased by Borland's OWLCVT utility, but it's still a difficult process.

USING APP FRAMEWORKS Applications built using OWL or MFC have the architecture depicted in Figure 1. In both li-

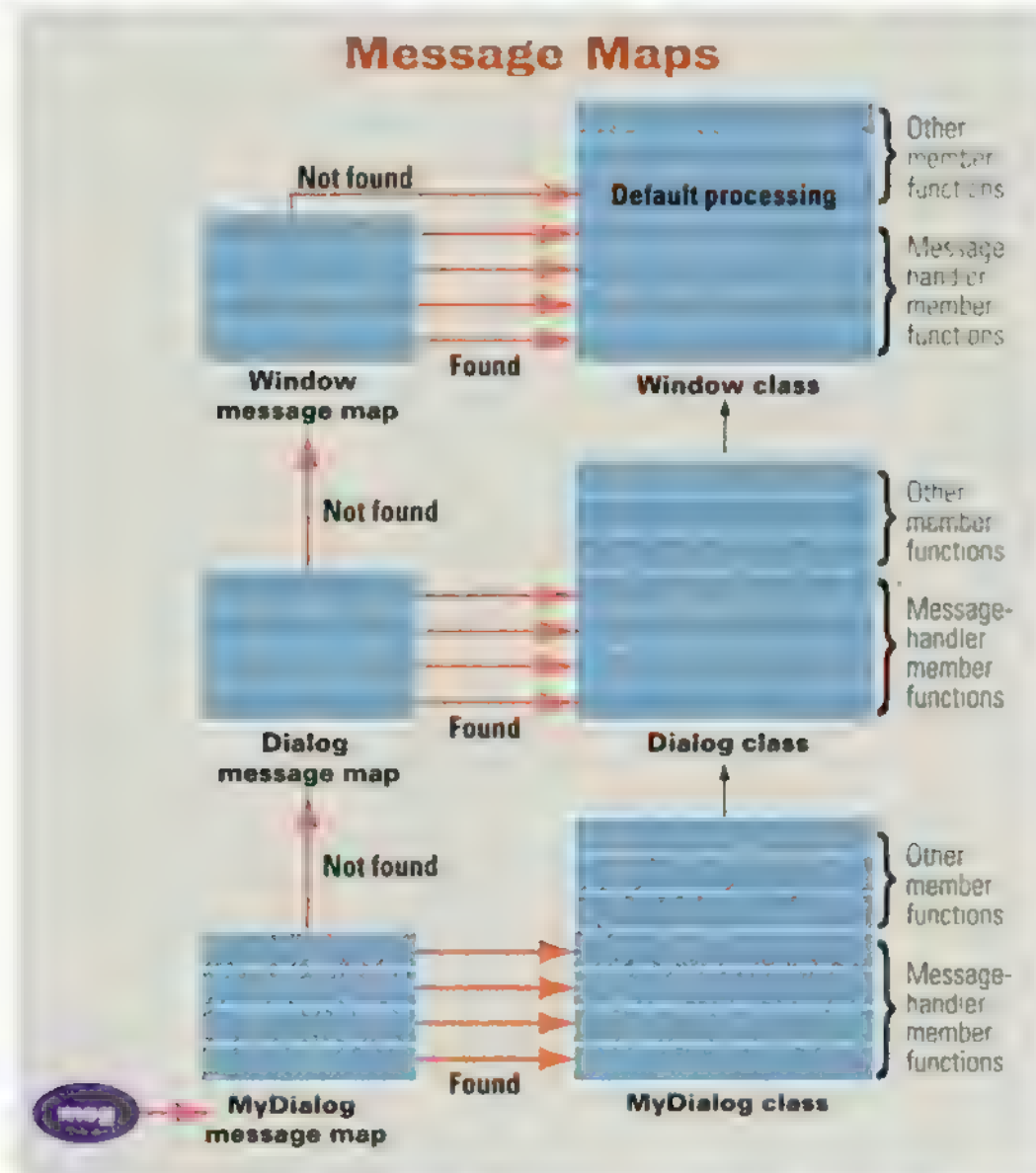


Figure 2: Message maps connect Windows messages to class member functions. When a message arrives, message maps are searched until either a match is found or the base class is reached.

braries there are a few fundamental classes that serve central roles. Let's look at these classes first.

An application class handles the dispatching and processing of messages, as does WinMain in a C program. With each framework, you derive your application class from the framework's generic application class, then you create your application object. Your application object takes over and does whatever you've specified, which usually includes some routine initialization and creation of a main window object. Once window objects exist, they are the focus of most activity in typical application framework programs.

A window class is used to specify the behavior of a window, which in Windows can be just about anything on the screen. Both OWL and MFC supply generic window classes from which more specialized classes are derived. Most applications derive a window class for their main window (or child windows in a multiple document interface [MDI] application), a window class for each dialog box, and various other window classes for special purposes such as toolbars. Some of these are derived directly from the framework's generic window class, but more often these window classes are derived from more specialized classes, such as a framework's generic dialog class.

Both application frameworks have dialog classes that help with all the chores in managing a dialog box. Because a dialog box is simply a specialized type of window, the dialog classes of both frameworks are derived from their generic window class. To implement your own dialog, you derive your own dialog class from the generic class. Your own dialog class typically initializes controls, manages any interaction between controls, and finally interrogates controls for their values as the dialog terminates.

To create a full-fledged application, you need all these classes and then some. If you haven't built programs from a collection of objects, this may seem like more complication, not less. The advantage doesn't accrue during your first effort in object-oriented programming, but during your third, fourth, fifth. Working with an orderly collection of classes lets you grow your applications one class at a time, and it often lets you reuse parts

of apps with relatively little effort.

MESSAGE MAPS One of the most important tasks of an application framework is to help your application receive messages. The goal is to use an individual function with strongly typed arguments to handle each specific type of message. There are actually two parts to the problem. One part is to translate a Windows message, which is delivered with its arguments packed into the wParam and lParam parameters, into a class member function call. The second part of the problem, which is less obvious at first, is to route the message to the right level in the class hierarchy. Both tasks revolve around a class's message map.

The overall operation of message maps is shown in Figure 2. When a Windows message arrives, the application framework searches for a handler in the message map of the class at the derived end of a class hierarchy. The framework simply plows through the message map, looking for a match. If one is found, the framework disassembles lParam and wParam into the original components, and then uses those components as parameters to a call of the handler function. (Note that this call is type-safe. If your handler doesn't declare the proper parameters and types for each message's handler, the compiler will complain loudly.) If a match isn't found, then the search process is repeated in the class's base class, and so on.

As an example, here's a short message map from an OWL application:

```
DEFINE_RESPONSE_TABLE1(HelloOwlMDIClient, TMDIClient)
    EV_COMMAND(CM_MDIFILENEW, CmFileNew),
    EV_COMMAND(CM_MDIFILEOPEN, CmFileOpen),
END_RESPONSE_TABLE;
```

The map has just two entries, which means the HelloOwlMDIClient class handles only two messages. The macro that starts the table indicates that this is the message map for the HelloOwlMDI-

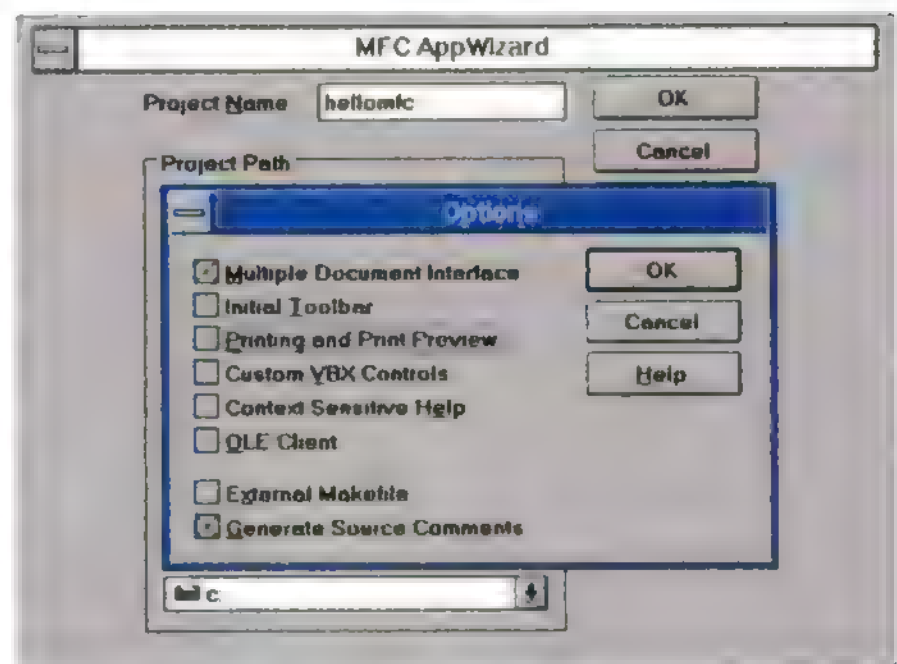


Figure 3: AppWizard lets you specify the characteristics of your application and then generates MFC code and resources.

Client class, which is derived from the TMDIClient class. EV_COMMAND is a macro that creates a map table entry for a WM_COMMAND message, which is the Windows message that's triggered when you make menu selections, make button-bar selections, use accelerators, and so on. The specific ID (stored in wParam when the message is sent) is the first parameter to the macro. The second parameter is a pointer to the member function that handles the message. For example, the CmFileNew() member function will be called if you make a menu selection whose ID is CM_MDIFILENEW. There's a specific macro to create a map entry for each Windows message.

Message maps aren't the only reason for using an application framework, but they are a compelling reason. When message maps were first introduced in MFC 1.0, they had to be maintained by hand. Today the three major compilers that you use to develop OWL or MFC applications—Symantec C++, Microsoft Visual C++, and Borland C++—can maintain message maps automatically, so you rarely need to add entries by hand.

WRITE IT FOR ME, PLEASE! With the code generators built into Visual C++, Borland C++ 4.0, and Symantec C++, you can generate working program templates with rich built-in functionality. Visual C++ and Symantec C++ generate MFC code; Borland C++ generates OWL code. (Symantec licenses their code generator from Blue Sky Software Corp., and Blue Sky also sells a straight C code generator.)

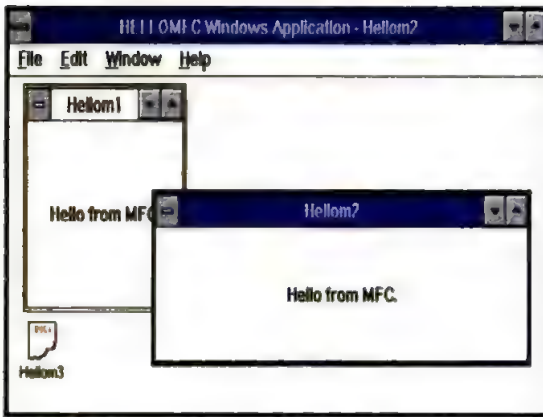


Figure 4: This MDI version of the Hello program was constructed using the MFC application framework.

The code generators create a skeleton set of classes that you flesh out to form the full application. First you fill in a check list of application features, and then the compiler generates the skeleton. Microsoft calls this part of the product AppWizard, Borland calls it AppExpert. Next you add classes and class member functions. Visual C++ does this with the ClassWizard, Borland C++ does this with the ClassExpert. Code generation doesn't free you from understanding Windows or your application framework, but it does save a great deal of time and effort.

TEST DRIVING THE APP FRAMEWORKS In the last part of this discussion, I want to take both frameworks for a short test drive. For a first spin around the block, let's just look at an MDI application that, you guessed it, says hello.

For both the OWL and MFC versions of this simple program, I used the application-generator tool included with the supplied integrated development environment (IDE). That cut my work down considerably, since I had to add only about four lines of code to make the program say hello.

Figure 3 shows the Visual C++ AppWizard dialog box used to generate the Windows MDI skeleton. Visual C++ generated five classes, each stored in a .H and a .CPP file, for a total of ten source code files plus a .RC file, a .DEF file, and a handful of housekeeping files.

The five classes that were generated are CHelloMfcApp—my application class, which was derived from CWinApp; CMainFrame—my main window class,

which was derived from CMDI-FrameWnd; CHelloMFC-Doc—my document class, which stored a greeting string; CHelloMFCView—my view class, which could display my document class; and CAbout-Dlg—a class to manage the supplied About dialog. Straight from the code generator, these classes compiled without error to form a working MDI application. The MDI child windows were empty, but you could change their size, reduce them to icons, and so forth.

To convert this into a traditional MDI Hello program (Figure 4), I modified the CHelloMFCDoc class to store a single string, then I plugged a few lines of code into the designated OnDraw() of my CHelloMFCView class. Here's what the code generator left:

```
void CHelloMFCView::OnDraw(CDC* pDC)
{
    CHelloMFCDoc* pDoc =
        GetDocument();
    // TODO: add drawing code here
}
```

All I did was fetch the greeting string from my document object, to which the code generator had already supplied a pointer, and display that string in the middle of the client area using the Paint device context. Here's the final version of OnDraw():

```
void CHelloMFCView::OnDraw(CDC* pDC)
{
    CHelloMFCDoc* pDoc =
        GetDocument();
    // new code starts here
    CString msg = pDoc->msg;
    RECT rect;
    GetClientRect(&rect);
    CSize txtSiz = pDC
        ->GetTextExtent
        (msg, strlen(msg));
    pDC->TextOut((rect.right
        - txtSiz.cx)/2,
        (rect.bottom
        - txtSiz.cy)/2, msg);
}
```

I'm sure you recognize the

standard Windows function calls, such as GetClientRect(), GetTextExtent(), and TextOut(). But if you're reading closely, you might notice that they are written slightly differently in the OnDraw() member function than the way you would write them in a standard C application. That's because these functions are members of CWnd (for GetClientRect) and CDC (for GetTextExtent and TextOut). CWnd is MFC's generic class for managing windows, and CDC is the analogous class for handling device contexts. I'm calling the class member functions, which add in the proper hwnd or hdc parameter, and then relay the call to Windows. (As a general rule, Windows functions that take an hwnd first parameter have analogs in MFC's CWnd class, and those that take an hdc first parameter usually have analogs in the CDC class.)

Creating an MDI Hello program using the OWL framework was somewhat harder because I was using a beta version of OWL, which didn't yet have all the kinks worked out of the document-and-view code generation. Therefore, I decided to build a plain MDI application. Instead of storing the greeting in a document object, I simply used a fixed string and plastered it onto the middle of my window.

The main dialog panel of Borland C++ 4.0's AppExpert is shown in Figure 5. As you can see, there are a lot of options, and this is only the first of 11 dialog panels used to control code generation. You can safely ignore much of what's in these panels, but most programmers prefer to have more choices, not fewer. Borland's AppExpert generated a set of OWL clas-

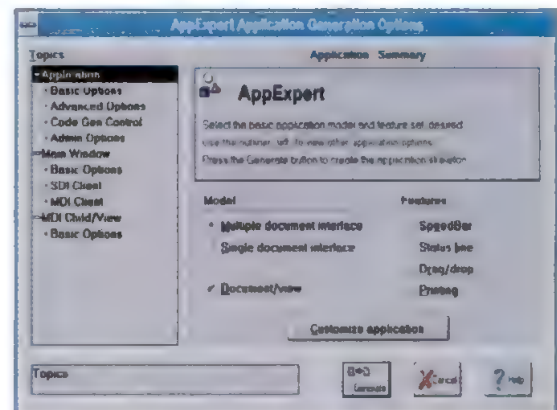


Figure 5: Like AppWizard, AppExpert lets you select application features and generate code but offers more fine-grain control.

ses that closely resembled the MFC classes we discussed a moment ago. The only significant difference was the absence of a document class. The resulting application is the Hello program shown in Figure 6.

AppExpert didn't leave behind a prebuilt place to put drawing code, so instead I had to add a drawing function to my MDI child-window class. But I didn't have to reach for the manuals; Borland's ClassExpert let me easily add a Paint() member function to my MDI child window class. ClassExpert put a declaration for the function into the class definition in the class's .H file, and it put the following into the .CPP file:

```
void THiWindow::Paint (TDC&
dc, BOOL erase, TRect& rect)
{
    TWindow::Paint(dc, erase, rect);
    // <<Your Code is here>>
}
```

If I had been adding a message handler function, ClassExpert would also have added an entry to the class's message map.

Once again, I inserted the usual Windows calls into the designated spot to form the following:

```
void THiWindow::Paint (TDC&
dc, BOOL erase, TRect& rect)
{
    TWindow::Paint(dc, erase, rect);
    // new code starts here
    char *msg = "Hello, OWL!";
    rect = GetClientRect();
    TSize txtSiz =
dc.GetTextExtent (msg, strlen
(msg));
    dc.TextOut((rect.right
- txtSiz.cx)/2, (rect.bottom
- txtSiz.cy)/2, msg, strlen
(msg));
}
```

You might be surprised that I didn't add a handler for Windows' WM_PAINT message when what I wanted to do was paint the window. Well, adding a

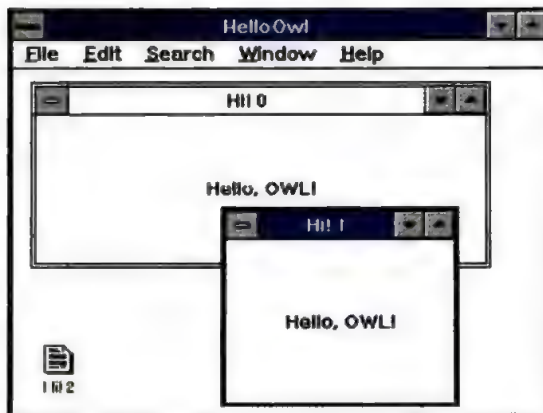


Figure 6: This MDI version of the Hello program was constructed using the OWL application framework.

WM_PAINT handler is only one way to proceed, and it turns out that it's slightly harder than what I did. When you handle WM_PAINT, you have to create a display context for painting, paint the window, and then clean up that display context after painting. This route would have led to the same result, but I decided to take advantage of the generic window class's EvPaint() procedure, which is designed to take care of all these details.

EvPaint() calls the Paint() virtual member function to do the actual window painting, so all I had to do was supply a Paint() function in my derived class. This lets me easily hook into the process without handling the message and minding the details myself. This option is available for WM_PAINT because it's one of the most common messages. Most messages need to be handled directly.

It's nice to say hello under Windows in only five or six lines of user-written code. This compares favorably with the traditional DOS character-mode version of Hello, which takes six lines of code. But the real benefit isn't in writing trivial programs in a tiny number of lines. Application frameworks let you organize your code so you can write huge applications that are easily maintained and extended. That's where application frameworks excel, and that's why they are the future of software development for graphical environments. □

KAARE CHRISTIAN IS AUTHOR OF THE BOOK BORLAND C++ TECHNIQUES AND UTILITIES AND DEVELOPS IMAGING SOFTWARE FOR NEUROSCIENTISTS.

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Utilities

BY JOHN DEURBROUCK

Files Live Long and Prosper with VULCAN

VULCAN—the name comes from some of the letters of *Vault*, and the ending letters of *Trashcan*—is two Microsoft Windows utilities in one. Configured as a Vault, VULCAN allows you to take snapshots of files so you can restore previous versions if necessary. In Trashcan mode, VULCAN provides a safe, reversible delete facility like Trash on the Macintosh or Shredder in OS/2.

VULCAN, written in C++, works by copying the files you specify into a dedicated subdirectory. In Trashcan mode, VULCAN deletes the original file once the copy has been made. In Vault mode, the original file does not get deleted. Once a file has been added to the VULCAN archive, it's possible to restore that file to its original location or to any other drive and directory.

To minimize the hard disk space it uses, you can tell VULCAN to limit its archive to a specific number of megabytes or always to leave a specific number of megabytes available. When you add files to the VULCAN archive—whether you're in Vault or Trashcan mode—VULCAN deletes its oldest files as necessary to accommodate your newer files. You'll be warned and given the opportunity to abort the operation before any file is deleted.

You can maintain multiple VULCAN archives as long as each is stored in a separate directory. Each archive can have a different mode (Vault or Trashcan), size, and other configuration options.

SETTING UP VULCAN VULCAN can be downloaded from either the Utilities/Tips Forum of PC MagNet or the Programming Forum on ZiffNet. You can also obtain VULCAN by mail. For details, see the sidebar "Our Utilities & How to Get Them." To install VULCAN, simply copy VULCAN.EXE to your hard disk. Put it wherever you like; it need not be in your DOS PATH or in the Windows directory.

Uninstalling VULCAN is also simple. Just delete its files and directories and remove any Program Manager entries you created for it. VULCAN makes no changes to any Windows .INI files besides its own VULCAN.INI, and it writes nothing to the Windows directories.

When you first run VULCAN, you

will see a dialog box asking what directory to use for VULCAN's archive (see Figure 1). The directory must already exist; use File Manager to create it if necessary.

The archive directory is where VULCAN will store the files you put into the Vault or the Trashcan. These files—all of which end in the .VCN extension—can coexist with other types of files as long as the other files don't use the .VCN extension.

Once you've chosen a directory, VULCAN will display the Configuration dialog box (see Figure 2). The directory name appears near the top of the dialog box. The first field, Caption, lets you augment the descriptive text under the VULCAN icon while the program is running. This feature lets you distinguish among multiple copies of VULCAN running at once. In the example, our caption will read, "Vulcan—System files". If you leave the field blank, the caption will simply be "Vulcan".

The Vulcan Mode box lets you choose Vault or Trashcan mode. Again, the difference is that in Trashcan mode, VULCAN deletes the original file once it's been copied to the archive; in Vault mode, VULCAN never deletes the original.

The Disk Limits section of the Configuration dialog gives you two choices that limit VULCAN's disk usage. You can limit the total size of the VULCAN archive or force VULCAN to leave a specific amount of space available. In the example in Figure 2, we chose to restrict the System archive to 4MB or less.

The next two options control warning messages. Warn On Overwrite applies only when you restore a file that previously has been placed into a VULCAN archive. If the file that you want to restore already exists and the Warn On Overwrite box is checked, VULCAN will warn you before overwriting it. Simply uncheck the box if you don't want to be warned of overwrites.

The Warn On Delete option is triggered when a new file can be added to the archive only if other files are deleted—in other words, if the file causes the archive to exceed its allotted size. For example, our 4MB System archive holds 4,196K (4MB). If it already has 4,190K

Top 10 Windows Utilities

Rank	Utility
1	INCTRL - Installation control
2	CLIPST - Extends the clipboard
3	CHANGER - Changes look of desktop
4	WINCMD - Command file interpreter
5	RCLICK - Puts menu bars at cursor
6	FNTPRN - Catalogs your fonts
7	WINTIDY - Organizes program manager
8	BUGS - Windows 3.1 screen saver
9	WPRINT - Prints in Windows 3.1
10	WTIME - Keeps PC clock accurate

This list is based on the total number of downloads each utility has had on PC MagNet over the past 12 months. To download these files, type GO ZNT:TIPS. For more information, see the sidebar "Our Utilities & How to Get Them."

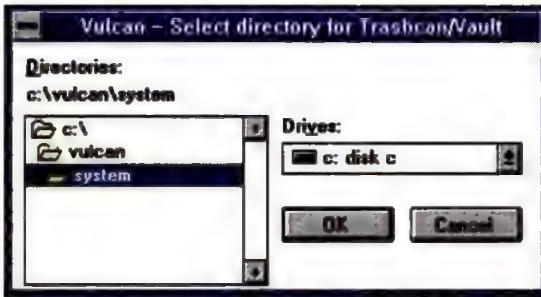


Figure 1: This dialog box allows you to choose the directory VULCAN will use for its archive.

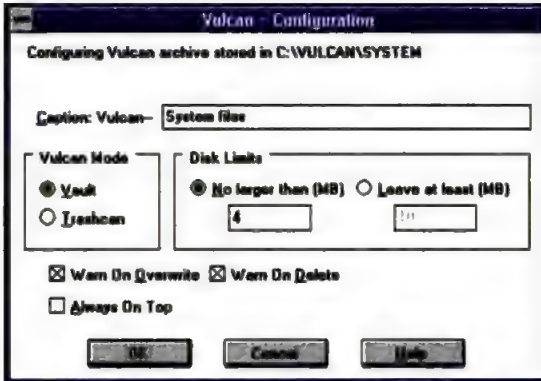


Figure 2: All of VULCAN's options can be set from within the Configuration dialog box.

in it and an 8K file is to be added, the final size would be 4,198K—which is too large. VULCAN will delete 2K of its oldest files before adding the new file.

If this option is checked, a warning will appear before the files are deleted. If you click on the OK button, VULCAN will delete the older files and add the new one. If you click Cancel instead, VULCAN leaves the older files intact and does not add the new file. Uncheck the box to avoid the warnings.

The Always On Top option makes VULCAN float above other windows. You can also control this behavior from the VULCAN icon's system menu. Always On Top is particularly handy when you've got File Manager running full-screen and you're dragging file after file into the Trashcan.

As soon as you hit OK on the Configuration dialog box, VULCAN is launched and appears as one of the icons shown in Figure 3. The icon labelled Vault is used when VULCAN is in Vault mode; the icon labelled Can is used when VULCAN is in Trashcan mode. The middle icon, labelled Vulcan, appears when the program is busy and can't act as a drag-

and-drop target. Double-clicking the icon caption is a quick way to switch between Vault and Trashcan modes.

ADDING FILES You can use drag-and-drop from File Manager to move files into a Trashcan or Vault. The files will be copied into the VULCAN archive (or if in Trashcan mode, deleted). The alternative to drag-and-drop is to click on the VULCAN icon and choose Add File... from the system menu. This will launch a dialog box that lets you add one file at a time.

Also on the system menu is the Browse option, which lists the files stored in the archive and lets you restore or delete them (Figure 4). (Another way to open the Browse dialog box is to double-click on the VULCAN icon.) The Browse dialog box shows each file's original location, size, time stamp, and attribute. It also shows the date

and time you placed the file into the archive, and the filename VULCAN is using to store the file.

To restore files to their original location, you select as many files as you wish from the Browse list box, then press the Restore button. Each file selected will be copied back to its original location and given its original filename. How VULCAN responds if the file already exists depends on whether you've checked the Warn On Overwrite option in the Configuration dialog box. If the option is checked, VULCAN will warn you that a file is about to be overwritten and give you the opportunity to cancel the Restore. Otherwise, VULCAN will overwrite the existing file—even if its Read Only bit is set—with the version stored in the VULCAN archive. The restored version has the attributes the original file had when it was "vaulted."

The Restore As... button is grayed out when you select multiple files. If you select only one file, you can use the Restore As... button to save the file to any disk, directory, or filename.

The Delete button is used to remove the selected file or files from the VULCAN archive. The Delete button affects only the archived copy. If you are using VULCAN in Vault mode and the original file still exists, it will not be affected.

One other subtle feature of the Browse dialog box bears mentioning. To the right of each filename in the list box there is one of four characters: left angle bracket, slash, backslash, or vertical line. The left angle bracket indicates the file was brought into the archive by itself. When two or more files are brought in at once through drag-and-drop, the first file is tagged with a slash, the last file with a backslash, and any files in between are tagged with vertical lines. These characters form a kind of bracket around the related files.

STARTING VULCAN AUTOMATICALLY

There are two ways to avoid having to select the archive directory each time you launch VULCAN. One way is to specify a path on the command line; the other way is to associate the .VCN file type with the VULCAN executable.

To use the command line method, highlight the VULCAN icon in Program Manager and then select File Properties... In the Command Line field, add the path for the archive. For example:

C:\VULCAN\VULCAN.EXE C:\VULCAN\SYS\

Note: The final backslash is *required*.

The other way to tell VULCAN what subdirectory to use is to associate the .VCN file type with VULCAN.EXE. Start File Manager, choose File Associate, type VCN in the Files with Extension box, type the full pathname for VULCAN (for example, C:\VULCAN\VULCAN.EXE) in the Associate With box, and click OK. Now whenever you double-click on a file with the .VCN extension, VULCAN will start-up in the subdirectory where that file resides.

Once you've set up the association,



Figure 3: The three VULCAN icons indicate Vault mode (left), Trashcan mode (right), and busy (center).

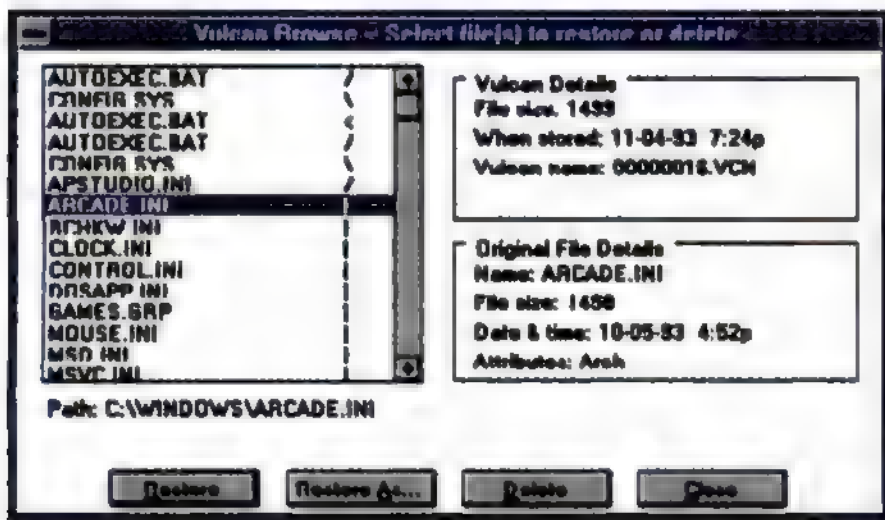


Figure 4: The Browse dialog box displays information about the files in the archive.

create an icon for VULCAN.VCN in the subdirectory you want to use. (VULCAN.VCN contains information about the files stored in the archive and will be discussed in more detail later.)

Since VULCAN.VCN is not normally written to disk until you close VULCAN or exit Windows, you must launch and then exit VULCAN at least once before you first use the file association method.

If you want, you can force VULCAN.VCN to be written to disk while VULCAN is running. It's a good idea to do this before you take some risky action that may cause your computer to crash. If you open the System menu and hold down the Shift key while clicking on Close, VULCAN will not close down but instead will save VULCAN.VCN. This trick is patterned after the fact that Program Manager will save its various files and options if you Shift-click on its Close menu item.

No matter which method you choose—command line or file association—you can automatically start specific

Trashcans or Vaults each time you load Windows by placing the icons for them in your Windows Startup group.

VULCAN LOGIC There is some interesting code in VULCAN. Put another way, I had to solve some interesting Windows problems. But before we get to the dirty tricks section, let's look at how VULCAN manages its files.

The first thing VULCAN does is find out what directory

it's managing. If a filename is on the command line, VULCAN uses the directory portion of that filename as its archive directory. (The filename itself is ignored.)

Settings for this archive are stored in VULCAN.INI using the directory name as the section heading, so the settings for each archive are independent. Once VULCAN looks in the .INI file, it uses the configuration information stored there or prompts the user for the desired mode, disk size, and so on.

Next VULCAN scans its archive directory. Every filename with an extension of .VCN is examined. If the root of its name is an eight-digit number (like 00000042.VCN), VULCAN assumes the file is a VULCAN archive file and adds the filename and file size to a linked list. If the file is TEMP.VCN, VULCAN erases it as junk. If the file is VULCAN.VCN, VULCAN ignores it for now. Any other file with the .VCN extension is reported to the user as a confusing entry and then ignored.

VULCAN then opens up VUL-

CAN.VCN, if present. Inside VULCAN.VCN is a copy of the header tacked onto the front of every VULCAN archive file in that directory. VULCAN reads through VULCAN.VCN, one record at a time, taking the data read and inserting it into the linked list formed by the directory search. This is a quick way to get all the file information stored into memory for display in the Browse dialog box.

VULCAN then goes through the linked list one at a time. If any file was found (like 00000042.VCN) without a corresponding entry in VULCAN.VCN, VULCAN attempts to read the header information directly from the file. If the file does not have a valid header, VULCAN reports the file as corrupted or non-VULCAN and suggests that the user delete it. Because an invalid file interferes with VULCAN's operation, VULCAN will exit if one is found.

If VULCAN gets this far without exiting, it is ready for business. VULCAN's next move lies in the hands of its window-procedure. From its normal iconic state, VULCAN can do the following: display its Help or About box, display the Browse, Configure, or Add Files dialog boxes, shut down, save VULCAN.VCN, change state from Vault to Trashcan and back again, and accept files through drag-and-drop. The Help and About boxes are just too pedestrian to discuss, but everything else has something interesting about it. So now we move onto dirty tricks.

RUNNING AS AN ICON VULCAN runs as an icon; it does not have a main window. All you ever see of VULCAN is an icon

Windows Message Handlers

Partial Listing

```
static int doubleclick_status = 0, doubleclick_time_delta = 550,
static DWORD doubleclick_time;

switch(msg)
case WM_MCLBUTTONDOWN:
    doubleclick_status = 0;
    doubleclick_time = GetTickCount();
    break;
case WM_INITMENUPOPUP:
    if (doubleclick_status) {
        if ((doubleclick_status == 1) &&
            (wParam == 0) &&
            !IsMenu(1)) {
            doubleclick_status = 2;
        } else doubleclick_status = 0;
    }
    break;
case WM_MENUSELECT:
    if ((doubleclick_status == 2) && (wParam == 0)) {
        doubleclick_status = (doubleclick_status == 2) ? 1 : 0;
    }
    break;
```

```
case WM_MENUSELECT:
    if ((doubleclick_status == 2) && (wParam == 0)) {
        doubleclick_status = (doubleclick_status == 2) ? 1 : 0;
    }
    break;
case WM_MENUSELECT:
    if ((doubleclick_status == 2) && (wParam == 0)) {
        doubleclick_status = (doubleclick_status == 2) ? 1 : 0;
    }
    break;
case WM_MENUSELECT:
    if ((doubleclick_status == 2) && (wParam == 0)) {
        doubleclick_status = (doubleclick_status == 2) ? 1 : 0;
    }
    break;
```

Figure 5: A double click on the VULCAN icon can be detected by a particular sequence of Windows messages.

Drag-and-Drop Message Handler

Partial Listing

```
switch(msg) {
...
case WM_DROPFILES:
{
    WORD total_files, current_file;
    static char whole_name_buf[200];
    total_files = DragQueryFile((HDROP) wParam, -1, NULL, 0);
    if (total_files) {
        for(current_file = 0; current_file < total_files; current_file++) {
            UINT dqf = DragQueryFile((HDROP) wParam, current_file,
                whole_name_buf, sizeof(whole_name_buf));
            if (dqf < 1) {
                // no filename, probably an error, bail out...
                // you'll probably want to show an error message
                break;
            }
            ProcessFile(whole_name_buf);
        }
        DragFinish((HDROP) wParam);
        return 0;
    }
...
}
```

Figure 6: For drag-and-drop messages, the number of files is obtained first. Then the name of each file is retrieved in the FOR loop.

or a dialog box.

How do you force VULCAN to remain iconic? The first step is to show the window with the SW_MINIMIZE parameter:

```
ShowWindow(hMainWindow,
    SW_MINIMIZE);
```

The window handle for the main window is stored in hMainWindow, and SW_MINIMIZE causes the window to show up as an icon. How do we prevent a double click—or a Task Manager switch-to—from forcing a Restore? By handling the WM_QUERYOPEN message in the window procedure in the following way:

```
switch(msg) {
...
case WM_QUERYOPEN: return 0;
...
}
```

Because 0 is returned when the WM_QUERYOPEN message is received, the main window does not open, and VULCAN remains iconized. This part is simple; the hard part is getting the VULCAN icon to respond to a double click by opening a dialog box—specifically, the Browse dialog box.

To monitor which messages were reaching my window procedure, I in-

serted test code that caused beeps to sound when mouse messages were received:

```
switch(msg) {
...
case WM_LBUTTONDOWNBLCLK:
    MessageBeep(-1); break;
case WM_NCLBUTTONDOWNBLCLK:
    MessageBeep(-1); break;
case WM_QUERYOPEN:
    MessageBeep(-1); return 0;
...
}
```

Double-clicking on the icon produced nothing but silence! I got two beeps (for WM_NCLBUTTONDOWNBLCLK and WM_QUERYOPEN) when I double-clicked on the caption but nothing from the icon. (The ability to capture a double click on the caption is used in another part of VULCAN.) Ultimately, I did find a sneaky way to detect double clicks on the icon itself. This led to the code you see in Figure 5.

Using Spy, which is included with the Windows 3.1 SDK, I monitored the messages that came to my window procedure. There were a lot of messages, but there was a sequence that always occurred: a WM_NCLBUTTONDOWN followed by a WM_INITMENUPOPUP. This sequence means the menu was popped up with the mouse.

Next, I look for a WM_MENUSELECT message and test for the values shown in Figure 5 to see whether the menu has been cancelled. Finally, I look for a WM_NCLBUTTONDOWN. The variables you see (doubleclick_status, doubleclick_time_delta, and doubleclick_time) are used to ensure that the messages occur in sequence and within the time allotted for a double click. That time's value, stored in doubleclick_time_delta, is updated when WIN.INI is changed and when the WM_CREATE message is handled.

If all of these events occur as expected, I post a message to my application that is equivalent to the user having selected Browse from the System menu.

At it happens, this same sequence can occur if the caption is double-clicked, and I wanted the program to respond in a special way to caption double-clicking. So in the handling for the WM_NCLBUTTONDOWNBLCLK message (which occurs only on a caption double click), I short-circuit the above sequence by setting doubleclick_status to 0. The WM_NCLBUTTONDOWNBLCLK message handler is used to toggle VULCAN between Vault and Trashcan modes.

CLEAN SHUTDOWNS The next task is to ensure that VULCAN.VCN is always written to disk before the program is exited. The simplest case is when the user closes VULCAN explicitly. Since explicitly closing VULCAN ensures that my window procedure will receive a WM_DESTROY message, I save VULCAN.VCN when that message is received:

```
switch(msg) {
...
case WM_DESTROY:
    vcnDestroy(); // saves VULCAN.VCN
                // and frees memory
    PostQuitMessage(0);
    return FALSE;
...
}
```

However, my window procedure does not receive a WM_DESTROY message if the user exits Windows while VULCAN is still running. To save VULCAN.VCN in that case, I added handling for the WM_QUERYENDSESSION message:

■ He Wrote a Utility, Won a Fridge

Senior editor Dale Lewallen and judges Charles Petzold, Jeff Prosize, Neil J. Rubenking, and Richard Hale Shaw were on hand August 21 at the Software Development '93 Conference for the announcement of this year's "Write a Utility. Win a Fridge." contest winner. Robert Lausevic, a programmer/analyst from Sacramento, California took top honors for his Windows utility, PASTE. Lausevic received \$500 and an under-the-desk fridge stocked with his favorite beverage.



Robert Lausevic is the winner of our "Write a Utility. Win a Fridge." contest.

Mr. Lausevic says he has had the idea for PASTE, a programmer's paste board that allows you to manage the copying of source code from one program to another, kicking around in his head for awhile. But the contest, he says, "gave me the push to sit down and write it." Now he uses it all the time while working at Intel, and as news of his winning entry spread through the halls at Intel, several co-workers asked for use of the utility.

Second-place awards went to the best-DOS utility and the most-creative utility, SUB and DOCOM, respectively. SUB, by Philip E. Rynes

of Woodridge, Illinois, scans program source code and substitutes one identifier for another. DOCOM, by David Stockbridge of Blowing Rock, North Carolina, stores and executes small .COM style utilities, saving disk space and reducing directory clutter. Mr.

Stockbridge and Mr. Rynes both won a *PC Magazine* jacket for their entries.

Runners up in all categories were Windows Utility, RUNPRO by Justin Willim Smith; DOS Utility, BIGSORT by David N. Kasmar and SDCOPY by Phillip B. Willows; Most Creative, MKMSGs by Rob-

ert Yennaco and MUT by John McKnight.

The "Write a Utility. Win a Fridge." programmers utility contest was cosponsored by *PC Magazine*, ZiffNet, and the Software Development Conference. Other judges who were not able to attend the announcement were Doug Boling, Ray Duncan, and Sal Ricciardi.

You can download PASTE and the other prize-winning utilities from ZiffNet's Programming Forum. Just look in Library 2 and search on the keyword FRIDGE.

and report to Windows that I've processed the SC_CLOSE message. If the Shift key isn't depressed, I don't process the message.

```
switch(msg) {
...
case WM_SYSCOMMAND:
    switch(wParam & 0xFFFF) {
        case SC_CLOSE:
            //Allow Shift-Close
            //to save VULCAN.VCN.
            if(0x8000 & GetAsyncKeyState(VK_SHIFT)) {
                vcnSaveVcnFile();
            }
        }
    }
}
```

```
return 0;
}
break;
```

DRAQ-AND-DROP It's not at all difficult to handle drag-and-drop, our final topic of interest. You simply inform Windows that you are receptive to drag-and-drop, and then process the WM_DROPFILES message.

The following line of code turns drag-and-drop on for the window whose handle is passed as hwnd:

```
DragAcceptFiles(hwnd, TRUE);
```

Changing the second parameter from TRUE to FALSE turns drag-and-drop off.

Once drag-and-drop is enabled, the client application will receive WM_DROPFILES messages whenever a drag-and-drop server sends some filenames. If you don't want to process WM_DROPFILES messages, you can simply return a nonzero value.

The most important functions to call when handling the WM_DROPFILES messages are DragQueryFile() and DragFinish(). DragQueryFile() is used to find out how many files are in a particular drag-and-drop operation and to retrieve each filename. DragFinish() releases the memory that the drag-and-drop server allocated for passing the data. If you don't call DragFinish() after processing the files, you will cause a memory leak in Windows.

A skeleton version of a handler for drag-and-drop transactions is shown in Figure 6. The first step is to determine how many files there are. This is accomplished in the first call to DragQueryFile(). When the second parameter is -1, DragQueryFile() returns the number of files in the drag-and-drop packet.

From there, the handler calls ProcessFile() with each filename in turn by calling DragQueryFile() once for each file. The files in the drag-and-drop packet are numbered from 0, so the range in our case is 0 to (total_files - 1). DragQueryFile() accepts this number as its second parameter, the current file. A pointer to a buffer that will hold the fully qualified filename when the function returns is also

```
switch(msg) {
...
case WM_QUERYENDSESSION:
    vcnSaveVcnFile();
    break;
...
}
```

I also wanted to allow the user to Shift-click on the Close item on the system menu to save VULCAN.VCN. This requires very little code. All I have to do is look at WM_SYSCOMMAND messages and check the state of the keyboard when an SC_CLOSE message arrives. If the Shift key is depressed, I save the file

passed to DragQueryFile().

One feature that you'd probably find in a commercial version of this utility is compression of its archive files. Although compression logic is not built into VULCAN, the hooks for compression are there. If you would like to add compression to VULCAN for your own use, follow these steps. First, #define the variable COMPRESSION. Then replace the

function store_filedata() in VULCAN.CPP with a compression routine, and replace the function restore_file() in BROWSE.CPP with a decompression routine. All the rest of the logic is already in place.

VULCAN is not a lot of code—especially when you consider that it's actually two utilities in one—but it demonstrates some subtle Windows programming

techniques in addition to being useful. As a Vault, VULCAN helps you keep older versions of important documents while you work on them. In Trashcan mode, VULCAN lets you dispose of unwanted files with drag-and-drop ease—and lets you restore them just as easily. □

JOHN DEURBROUCK, A PROGRAMMER SINCE 1976, LIVES IN SEATTLE, WASHINGTON.

GUIDE TO OUR UTILITIES & HOW TO GET THEM

VULCAN

PURPOSE: VULCAN is two Windows 3.1 utilities in one—a Trashcan and a Vault. In Trashcan mode, VULCAN provides a safe, reversible delete facility. In Vault mode, VULCAN lets you archive older versions of important documents as you work.

SETUP: To install VULCAN, simply copy the file VULCAN.EXE to your hard disk. The directory you choose need not be in your DOS PATH or your Windows directory.

When you first launch VULCAN, it will ask you to select an archive directory. To avoid this dialog box, you can either associate the .VCN extension with VULCAN.EXE or add the archive directory path to the command line for the VULCAN icon.

REMARKS: You can launch as many copies of VULCAN as you want during a single Windows session. The only limitation is that each archive must have its own directory. For example, you may want to use one instance of VULCAN as a Vault and another instance as a Trashcan.

VULCAN runs as an icon, and the icon changes depending on VULCAN's mode—Vault or Trashcan. Double-clicking on the icon's caption will toggle between modes. To move files into VULCAN, you can use the Add Files... option on the system menu or drag-and-drop to VULCAN's icon from the File Manager. With the Add Files... option, you can add only one file at a time. If you are running VULCAN in Trashcan mode, the original file will be deleted after you move it into the archive. In Vault mode, the original file is left untouched.

When you double-click on the VULCAN icon, the Browse dialog box opens. This dialog box displays a catalog of the files contained in the archive and lets you restore or delete files from within the archive.

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PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

PCs

PUTTING YOUR PC IN OVERDRIVE

❓ I have a computer with an 80486DX/33 chip that I'd like to upgrade. Unfortunately, my motherboard is of an older design, and it doesn't have a socket for an OverDrive chip. Is there hope for my older system?

Marc VanDenhende
Borsbeek, Belgium

► **PC MAGAZINE:** Intel makes OverDrive chips for all 486DX and 486SX systems except the 486DX/50. So you can install an OverDrive chip—even if you don't have an OverDrive socket.

The OverDrive sockets have 169 pins, which allow for a key that helps you align the chip in the socket. If you don't have one of these sockets on your motherboard, however, you can simply remove the existing chip and replace it with a 168 pin OverDrive chip. This means you'll have to get it aligned properly on your own, but since the corners of both your original and the new chip are marked, all you have to do is make sure the replacement is installed in the same orientation as the original.

—Alfred Poor

UPDATING AN OLD MACHINE

❓ I have an older IBM-compatible 80286 computer with a BIOS dated September 22, 1986. I want to add a 1.44MB, 3.5-inch floppy disk drive, but the CMOS setup lists only 320K, 360K, and 1.2MB drives. Is there any way I can proceed?

Bill Adams
Albany, New York

► **PC MAGAZINE:** There are a number of different solutions that you could try, ranging from special drivers to a new BIOS. But before you try any of these, you should consider a solution that may be even easier. You may be able to use a utility that lets you edit your CMOS configuration so it will be aware that your 3.5-inch floppy disk drive exists.

There are both commercial programs, such as QA Plus from DiagSoft or CheckIt PRO from TouchStone Software, and shareware programs, such as EDCMOS, available as EDCM.EXE from Library 16 (General Utils) of the Utilities/Tips Forum on PC MagNet, that permit you to edit your computer's CMOS settings. These allow you to enter the value directly into your CMOS so that your computer can recognize the new floppy disk drive, saving you the trouble of locating and installing a new set of BIOS chips. The main drawback to editing your CMOS is that you must be careful what you change, since you can make a mess of your system configuration if you're not careful. Further, you must remember to use the utility again to edit your CMOS settings if they are ever lost, such as through the failure of the backup battery.—Alfred Poor

Operating Environments

DOS BOX ALERT

✓ **TIP** In Microsoft Windows 3.1, if you open multiple DOS boxes, go into a subdirectory in one DOS box, then remove that subdirectory in another box, the first DOS box does *not* recognize that its current directory is invalid. You can create files, delete files, copy files, and do pretty much anything else in this nonexistent directory. But if you change to another directory or quit the DOS box, the directory vanishes along with all its files, leaving only lost clusters behind.

In a production environment this can easily occur. In my case I was coding in one DOS box and testing my program in the other. When done testing, I deleted the files in my test directory and got rid of it, leaving the other DOS box running. Later I needed to use a temporary directory again, so I flipped to the DOS box and found myself conveniently in a work directory already. However, it was an invalid directory, and my work disappeared when I left it!

You should note that (as far as I can

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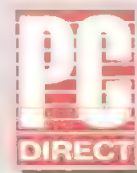
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tell) this only affects a local disk drive. Novell is smart enough to deal with this type of situation. And the problem won't occur in OS/2 since OS/2 doesn't allow you to remove a directory while it's in use by another application.

*Dave Hammond
Parma, Ohio*

► **PC MAGAZINE:** This was a hard one to believe—you may want to test it for yourself! Do it on a floppy disk, though, so you won't screw up your hard disk's file structure. Open two DOS boxes and switch to the floppy disk in both of them. In one box, create a directory TEMP and switch to that directory. In the other DOS box, immediately remove the directory TEMP. Now go back to the first DOS box and create some files or subdirectories in TEMP—they'll seem to be perfectly valid. As soon as you switch to another directory, though, they're history. If you exit Windows and run CHKDSK on the floppy, you'll see that your files have turned into lost clusters.

Running SHARE doesn't help, because SHARE doesn't treat a DOS box's current directory as an open file. The only way to avoid this problem is to ad-

just your work habits so it can't occur. Simply close all nonessential applications before performing surgery on your directory tree. That should prevent the problem.—*Neil J. Rubenking*

STAYING ON TOP

❏ **TIP** If you appreciate the always-on-top feature available in Windows 3.1, you'll be interested to know that this handy little tool is easily accessed by any Microsoft Visual Basic program. You activate it through the Windows API function SetWindowPos(). In your form dec-

laration section, copy the following function, all on one line:

```
Declare Function SetWindowPos Lib
  "User" (ByVal hWnd As Integer,
  ByVal hWndInsertAfter As Integer,
  ByVal x As Integer, ByVal y As
  Integer, ByVal cx As Integer,
  ByVal cy As Integer, ByVal wFlags
  As Integer) As Integer
```

Next copy these three constants to the declaration section:

```
Const SWP_NOSIZE = &H1
Const SWP_NOMOVE = &H2
Const SWP_NOACTIVATE = &H10
```

Now the following three lines will make a form always stay on top:

```
handle = form1.hwnd '(or whatever
  form #)
HWND_TOPMOST = -1
wp = SetWindowPos(handle,
  HWND_TOPMOST, 0, 0, 0, 0,
  SWP_NOSIZE + SWP_NOMOVE +
  SWP_NOACTIVATE)
```

To cancel the always-on-top feature, use the same lines but set HWND_TOPMOST to -2 instead. When something is this handy and easy, how can you resist putting it everywhere?

*Steve Pugliese
Cambridge, Massachusetts*

► **PC MAGAZINE:** Figure 1 is the text for a very simple Visual Basic form that implements the always-on-top feature described above. You can download the corresponding .FRM file from PC Mag-

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Complete Listing

```

Declare Function SetWindowPos Lib "User" (ByVal hWnd As Integer, ByVal
hWndInsertAfter As Integer, ByVal x As Integer, ByVal y As Integer,
ByVal cx As Integer, ByVal cy As Integer, ByVal wFlags As Integer)
As Integer

Const SWP_NOSIZE = &H1
Const SWP_NOMOVE = &H2
Const SWP_NOACTIVATE = &H10
Const HWND_TOPMOST = -1
Const HWND_NOTOPMOST = -2
Const SWP_JUSTZ = SWP_NOSIZE + SWP_NOMOVE + SWP_NOACTIVATE

Sub Option1_Click ()
    wp = SetWindowPos(form1.hWnd, HWND_TOPMOST, 0, 0, 0, 0, SWP_JUSTZ)
End Sub

Sub Option2_Click ()
    wp = SetWindowPos(form1.hWnd, HWND_NOTOPMOST, 0, 0, 0, 0, SWP_JUSTZ)
End Sub

```

Figure 1: This source code can be turned into a simple Microsoft Visual Basic form that implements the Windows 3.1 always-on-top feature. The first four lines in this listing should be typed as if all on one line.

Net's Utilities/Tips Forum archived as FORM.ZIP or simply recreate it yourself. Open a new form and create two option buttons titled Always On Top and Not Always On Top, setting the value of the first to FALSE and the value of the

second to TRUE. Highlight the form in the Project window and press the View Code button. Then select Load Text from the Code menu and load the text from Figure 1. Run the program and click Always On Top—then try to move one

of the Visual Basic windows on top of the form. You can't!

SetWindowPos() is a multipurpose function: It can change a window's size, position, or order in the window stack (called Z order), and it can optionally activate the affected window. Making a window always on top simply involves placing it in the Z order after the imaginary window HWND_TOPMOST. Thus, the three SWP_ constants tell SetWindowPos() *not* to move, resize, or activate the window. To save typing, I combined those three into the constant SWP_JUSTZ. With unnecessary variables eliminated, the code to apply or remove the always-on-top feature boils down to a single line!

Do bear in mind that when a window is always on top, it obscures the windows below it. Keep your stay-on-top windows small! Note also that if several windows are using this feature, they simply form a second window stack that's always above the regular window stack. This is an interesting feature indeed, but you shouldn't overuse it.—Neil J. Rubenking

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Word Processing

A WINWORD ROW- AND PARAGRAPH-MOVING TRICK

TIP Here's a simple, timesaving shortcut for working with tables in Microsoft Word for Windows: You can move a row in just two quick steps, without needing to cut and paste. First, highlight the row you want to move. Then press Shift-Alt-Up Arrow or Shift-Alt-Down Arrow, depending on which direction you want to move. Each time you press the key combination, the row will move up or down by one row.

Sarah Braud
Baton Rouge, Louisiana

► **PC MAGAZINE:** If this is documented anywhere in the WinWord manuals or on-line help, it's well hidden. The only suggestions I could find for moving rows rely on either cutting and pasting the rows or switching to outline view and then dragging with the mouse.

The feature seems to be a kind of leakage from outline view, where Shift-Alt-Up Arrow or Shift-Alt-Down Arrow lets you move a selection (including collapsed text) to rearrange the structure of a document. And if you record these keystrokes as part of a macro, WinWord enters them as the WordBasic commands OutlineMoveUp and OutlineMoveDown even when moving rows in a table—a bit of WordBasic trivia that may someday come in handy when you're writing a macro.

More important, this tip can be extended significantly. The first step—highlighting the row you want to move—isn't even necessary. If you simply place the cursor or selection anywhere in the row, pressing the Shift-Alt-Up Arrow or Shift-Alt-Down Arrow will both highlight the row and move it. What's more, you can select all or part of several rows and move them all at once.

You can even use this trick to break a table in two. If the cursor or selection is in the last row, for example, and you have at least one paragraph after the table, you can hit Shift-Alt-Down Arrow

to break the selected row or rows off from the rest of the table and move them below the paragraph under the table. If you want a blank line between two sections of the table, then you can simply add a blank line (in the form of a hard carriage return) after the table, and then move the bottom row or rows.

This technique isn't confined to tables. You can use it to move text as well: Place the cursor in or select the paragraph or paragraphs to move, then hit Shift-Alt-Up Arrow or Shift-Alt-Down Arrow. Nor is it confined to WinWord 2.0. I tested it on Version 1.0 as well as 2.0c, and it will presumably work with all versions in between.—*M. David Stone*

ADDING FOREIGN LANGUAGE CAPABILITIES TO YOUR PC

► **PC MAGAZINE:** Where can you locate a word processor that can handle Arabic, Urdu, or Vietnamese? Could you find Windows fonts for the major Indic languages or an extension to DOS that lets you enter, view, and print Chinese characters with your favorite DOS word processor?

If your work requires languages other than English or the common European varieties, you'll be interested in the second edition of Ian Tresman's *Multilingual PC Directory*. There you'll find thumbnail sketches of about 400 products that offer some level of non-English language support, a list of company names and addresses, reference material that includes no less than 29 tables of character sets, and an extensive index to product profiles that lets you quickly find a list of the relevant products.

The products covered range from widely known (Word for Windows and WordPerfect for DOS, for example) to highly specialized (Mongolian Fonts for Multi-Lingual Scholar). You'll even find font packages for Aramaic (available in fourth-, sixth-, eighth-, and ninth-century fonts) and Egyptian hieroglyphics.

Somewhat less exotic index entries cover the range from desktop publishing in Afrikaans to hyphenation in Swahili. And of course you'll find an abundance of entries for common languages such as French, Spanish, German, Italian, Kor-

ean, and Japanese. Although the emphasis is on word processing and related programs, you'll find entries for database and other types of programs as well.

Ultimately, this is the sort of reference book that you either don't need at all or can't get along without. Even if you don't really need it, however, you might enjoy browsing through it. After all, where else can you find little nuggets such as, "The Cherokee Indian alphabet includes the character 4. . [while the letter] Z is pronounced no"?

You can order the *Multilingual PC Directory* from Knowledge Computing, 9 Ashdown Dr., Borehamwood, Herts WD6 4LZ, U.K., for £35 U.K. (approximately \$50 U.S. dollars at current exchange rates) plus postage (£8 per copy). Alternatively, you can use MasterCard or Visa. For details, contact Knowledge Computing by voice (011 44 81 953 7722), fax (011 44 81 905 1879), or CompuServe (72240,3447).

—*M. David Stone*

Spreadsheets

ORDINAL-NUMBER SUFFIXES

TIP I frequently incorporate numbers followed by a two-digit suffix (for example, 1st, 2nd, 3rd) into my Quattro Pro for DOS spreadsheets. These suffixes are indications of order within a series. I came up with a formula that would produce the appropriate suffix in the cell to the right of the number. The formula is

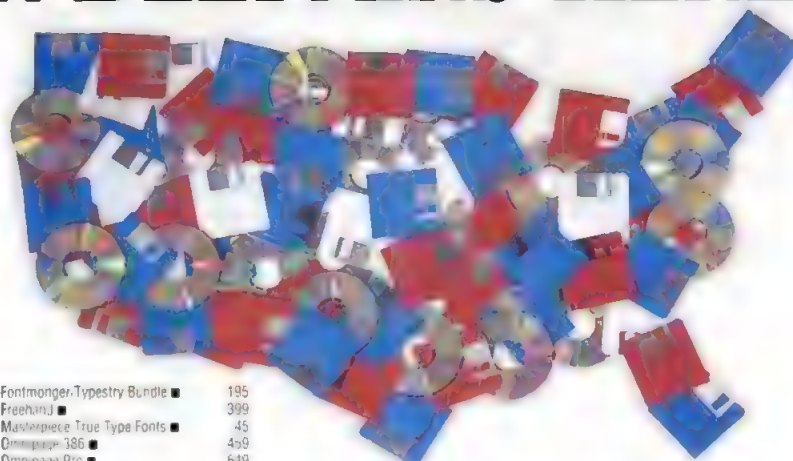
```
=CHOOSE(A1,"th","st","nd","rd","th",
"th","th","th","th","th")
```

This first formula, which works only for one-digit numbers, uses the @CHOOSE() function. The first argument of the function is the number for which we are seeking a suffix; it also indicates which value should be returned from the series of ten arguments that come after it. If the value of the first argument is 0, the next value (the string "th") is returned; for a value of 1, the following value ("st") is returned, and so forth.

Since the suffix is usually based only on the last digit, the formula can be elaborated for numbers over one digit long:

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```
@CHOOSE(A1-10*@INT(A1/10),"th",
"st","nd","rd","th","th","th",
"th","th","th")
```

The first argument is replaced by an expression that returns only the last digit of a number. The above formula works for all numbers except those ending in 11, 12, or 13.

To accommodate numbers ending in 11, 12, or 13 (which should have the suffix "th", instead of "st", "nd", and "rd"), we need a slightly more elaborate formula:

```
@CHOOSE(@IF(@INT(A1/10)-10*@INT(A1/
100)=1,0,A1-(10*@INT(A1/10))),
"th","st","nd","rd","th","th",
"th","th","th","th")
```

The expression

```
@INT(A1/10)-10*@INT(A1/100)
```

returns the second-to-last digit in the value stored at cell A1. @IF() in the above formula tests to see if this digit is a 1. If it is, the suffix should be "th", no matter what the final digit is. If this condition is met, a value of 0 is returned to the first argument of @CHOOSE(), making the function return "th".

*Christian S. Adams
Ocean Grove, New Jersey*

► **PC MAGAZINE:** Mr. Adams's formulas return the appropriate ordinal suffix for any cardinal number. To create the full ordinal number (as a text string based on the number's digits), you'll want to con-

```
Function Ordinal(Cardinal)
Intermediate1 = Int(Cardinal / 10)
Intermediate2 = Application.Floor(Intermediate1, 10)
TensDigit = Intermediate1 - Intermediate2
Intermediate3 = Application.Floor(Cardinal, 10)
UnitsDigit = Cardinal - Intermediate3
If TensDigit = 1 Then
    Ordinal = Application.Text(Cardinal, "0") & "th"
Else
    Suffix = Application.Choose(UnitsDigit + 1, "th", "st", "nd", "rd",
    "th", "th", "th", "th", "th", "th")
    Ordinal = Application.Text(Cardinal, "0") & Suffix
End If
End Function
```

Figure 3: This Visual Basic program creates a Excel 5.0 function that accepts a cardinal number and returns a text number with the ordinal suffix added.

catenate the suffix with the original number. For example, if A1 contains 123 and A2 contains Mr. Adams's elaborate @CHOOSE() function, you can use

```
@STRING(A1,0)&A2-
```

to obtain the text value "123rd".

If you're using Quattro Pro for Windows or Microsoft Excel, you can substitute the expression @FLOOR(A1,10) for the expression 10*@INT(A1/10). The @FLOOR() function rounds its first argument down to the nearest multiple of the second argument.

If the arithmetic gymnastics required to get the final and penultimate digits from a cardinal number are not your cup of tea, you can substitute text gymnastics. For example, the formula

```
@VALUE(@RIGHT(@STRING(A1,0),1))
```

returns the last digit in the number stored

at A1. The expression @STRING(A1,0) converts A1's value to a text string formatted as an integer. Surrounding this expression with @RIGHT(and , 1) gives us the rightmost character in this text string. And supplying all of that as an argument to the @VALUE() function converts the lopped-off character back into something your spreadsheet recognizes as a number.

To get the second-to-last digit, use

```
@VALUE(@LEFT(@RIGHT(@STRING(A1,0),
2),1))
```

This monster uses @RIGHT to get the last two digits of A1's value, then applies @LEFT to pluck out the leftmost of these two digits—in other words, it finds the second-to-last digit.

Excel users who want to apply Mr. Adams's logic to many cells in a worksheet can save themselves some trouble (and memory) by encapsulating the logic in a user-defined function. Figure 2 shows how this function could be created in the macro language of Excel 4.0. If you create this function, be sure to assign the names in column A to the adjacent cells of column B. Also assign the name Ordinal to cell B1 and select the Function option button at the bottom of the Define Name dialog box. To apply the function to cell A1, then, you would write

```
=ADAMS2.XLM!Ordinal(A1)
```

If you're using Excel 5.0, you can create this function with the Visual Basic code, as shown in Figure 3.

If you compare the Visual Basic ver-

ORDSUF.XLM

	A	B
1		Ordinal
2		=ARGUMENT("Cardinal",1)
3	Intermediate1	=INT(Cardinal/10)
4	Intermediate2	=FLOOR(Intermediate1,10)
5	TensDigit	=Intermediate1-Intermediate2
6	Intermediate3	=FLOOR(Cardinal,10)
7	UnitsDigit	=Cardinal-Intermediate3
8		=IF(TensDigit=1)
9		= RETURN(TEXT(Cardinal,"0")&"th")
10		=ELSE()
11	Suffix	= CHOOSE(UnitsDigit+1,"th","st","nd","rd","th","th","th","th","th","th")
12		=END.IF()
13		=RETURN(TEXT(Cardinal,"0")&Suffix)

Figure 2: This user-defined function—created with Microsoft Excel 4.0's macro language—produces ordinal-number suffixes.

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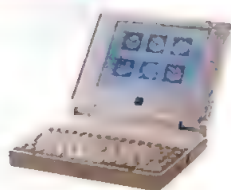
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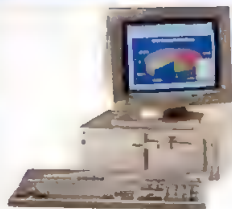
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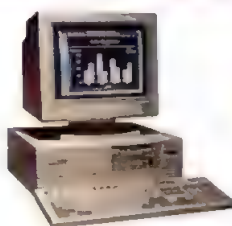
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sion with the .XLM version, you'll see the logic is exactly the same. The coding differences are minor. Because the required argument is indicated in the Function declaration with which the code begins, there is no equivalent for the .XLM ARGUMENT() function. The Floor, Text, and Choose functions are prefixed with the keyword Application, indicating that these are Excel functions, not Visual Basic functions. (You could do this with the Int() function, but that isn't necessary since Visual Basic also has an Int() function equivalent to Excel's.) Finally, the lines beginning with Ordinal = supply the function's return values. These are equivalent to the .XLM version's RETURN() functions.

You can download the files mentioned here from PC MagNet archived as ORDSUF.ZIP.—*Craig Stinson*

Databases

AUTO INCREMENT AND DECREMENT IN PARADOX

TIP The PAL script shown in Figure 4 can be used to add interactive increment and decrement capabilities to Paradox. Once the script is active, you can press the Plus key to increment or the Minus key to decrement the current field's value. For example, if the current field is a date field, pressing the Plus key will add 1 to the date (just like Quicken!).

Harry Goldman
Buffalo Grove, Illinois

► **PC MAGAZINE:** Such an auto-increment/decrement feature is so useful that it should be built into most products. In the meantime, users of the DOS version of Paradox will find Mr. Goldman's routine very handy.

To make the increment/decrement feature available whenever you start Paradox, place the following two lines in your Init.sc file:

```
SetKey 43 Inc.n = 1 Play "Inc"
SetKey 45 Inc.n = -1 Play "Inc"
```

The SetKey command is used to bind PAL code to a keystroke so that whenever you press that key the code will be executed. The two SetKey commands shown above set the Plus and Minus keys so that the appropriate PAL code is executed when you press them.

In the first line, the Plus key (whose keycode is 43) assigns 1 to the Inc.n variable and then plays the Inc script. The next SetKey command sets up the Minus key the same way, except that it assigns -1 to the Inc.n variable. As you might guess, the value assigned to the Inc.n variable is added to the field being changed. So if Inc.n is -1, the field is decremented. If it's 1, the field is incremented. Since [] represents the current field, the statement [] = [] + Inc.n does all the work.

The Inc script shown in the figure does a fair amount of error-checking and may require some explanation. In Paradox for DOS you handle runtime errors by setting up an error-handling procedure and then telling Paradox the name of the rou-

tine. A special system variable named Errorproc is reserved to hold the name of your error handler.

When an error occurs, Paradox calls your error procedure within which you can use several functions to determine what happened. For example, the ErrorCode() function returns the Paradox error-code number that corresponds to the error. (These codes are documented in Appendix D of your PAL reference documentation.) You can also call ErrorMessage() to return the text of the most recent error message. On a network, ErrorUser() will return the name of the user who is holding the lock on an object with which you are attempting to work. You can also issue the ErrorInfo command, which creates a dynamic array with information about the runtime error.

When your error handler is finished, it must return a value to Paradox that indicates how you want to resume execution. Returning a 0 tells Paradox to reexecute the statement that caused the error. A 1 causes execution to continue with the statement that immediately follows the one that caused the error. Finally, a 2 displays the Script Break menu, which lets you choose Cancel or Debug (this is the default).

In his Inc script, Mr. Goldman sets up the IncError.u() procedure to handle runtime errors and notifies Paradox with the following line

```
Errorproc = "IncError.u"
```

When an error occurs and the IncError.u procedure gets control, the ErrorCode()

INC.SC

1 of 2

```
; INC.SC
; Script to allow increment or decrement of a field by pressing
; the [+] or [-] key.
;
; This script will work with any of the following field types:
; N - Numeric
; S - Short Integer
; $ - Currency
; D - Date
;
; Use the SETKEY command to bind this script to the + and - keys
; and to assign the increment value. For example, in a script use
; the following commands:
;
; SetKey 43 Inc.n = 1 Play "Inc" ; [+] key
; SetKey 45 Inc.n = -1 Play "Inc" ; [-] key
;
; This script will test for the following conditions:
; - There must be a display image of the workspace
; (Table view or form view)
; - The current field must be a valid type to increment
```

```
; - The user must be in EDIT or COEDIT mode
; - The user can't be in FieldView mode
; - The current field can't be blank
; - The variable Inc.n must have a value of 1 or -1
;
; An Error Procedure is defined to capture errors that could be
; caused 'after the fact'. For example, incrementing a field beyond
; a HIGH or LOW Valcheck setting will cause an error.
;
; Tested with Paradox For DOS 4.0
;
Proc IncError.u()
  private Err.n

  Err.n = ErrorCode()

  Switch
    Case Err.n = 23 :
      Beep
      Message "Value Is Out Of Valcheck Bounds"
      Sleep 1000
```



Figure 4: This listing provides the code and error-checking routines that will allow you to add interactive increment and decrement capabilities to Paradox.

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INC.SC

2 of 2

```

Return 1
Case Err.n = 20 :
  Beep
  Message "No Table Is On The Workspace"
  Sleep 1000
  Return 1
Endswitch
Endproc

Proc Inc.u()
  private Quit.1,
  Errorproc

  Quit.1 = False
  Errorproc = "IncError.u"

  Switch
    Case ImageType() <> "Display" : Quit.1 = True
    Case Search(Substr(FieldType(),1,1),"SN$D") < 1 : Quit.1 = True

```

```

Case Search("EDIT",Upper(Sysmode())) < 1 : Quit.1 = True
Case IsFieldView() : Quit.1 = True
Case Isblank([]) : Quit.1 = True
Case Not Isassigned(Inc.n) : Quit.1 = True
Case Abs(Inc.n) <> 1 : Quit.1 = True
Endswitch

If Quit.1 Then
  Beep
  Quit
Endif

[] = [] + Inc.n
EndProc

Inc.u()

```

function is called to get the error number. If it's 23, Invalid Field Value, the user tried to increment or decrement a field to a value that is not allowed. A 20, Invalid Context for Operation, probably means the Plus or Minus key was pressed but a table is not on the workspace. In either case, a beep is emitted, a message is displayed, and the procedure returns 1, telling Paradox to skip the offending statement and continue. If some other error occurs, the routine simply returns no value, and Paradox takes its default action of displaying the Script Break menu.

Before the Inc.u() procedure actually increments or decrements the field, it checks a number of conditions. First, the Imagetype() function is called to make sure an image is on the display in either table or form view. If no images are present the function returns None (or if a Query image is shown, the function returns Query). In either case, a beep is emitted and the procedure quits.

Next, the FieldType() function is used to make sure the field being changed is one of the supported types: numeric, short integer, currency, and date, as noted in the comments to the code. The Sysmode() function is then consulted to make sure Paradox is in Edit or CoEdit mode. To ensure that Field view hasn't been selected, IsFieldView() is called. Next, the Isblank() function is used to make sure the current field is not blank. (Since the result of adding or subtracting 1 to a blank value is not defined, blank values are not allowed).

Finally, Isassigned() is called to make sure the Inc.n variable has been assigned a value, and the Abs() function is called

to make sure the value is either 1 or -1, the only allowed values.

Last but not least, if all the proper conditions are met, the value of Inc.n is added to the current field by the statement `[] = [] + Inc.n`.

You can download the INC script (INC.SC) from PC MagNet's Utilities/Tips Forum. —*Sal Ricciardi*

Networking

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Bill Effy
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► **PC MAGAZINE:** When networking components (and PCs) were expensive, you had to diagnose a problem before trying a cure—but the reduced cost of LAN parts has changed that procedure. Modern troubleshooting techniques frequently start with replacement, so first I'd budget for spare LAN adapters, connectors, and cables. I'd also stock an extra wiring hub since these devices can suffer hidden damage (from lightning strikes, for example), and substitution is often the only way to prove a hub is bad.

The first LAN diagnostic tool I'd buy, a protocol analyzer, shows you what's going on across the network cable. Although the term might sound imposing, the product is easy to use. Triticom's LANdecoder software, for example, installs on any PC, reports problems such as Ethernet collisions and malfunctioning LAN adapters, tests Ethernet cable segments, identifies traffic between specific network nodes, and ferrets out the functions of many kinds of packets. Triticom (612-937-0772) prices LANdecoder/e (an Ethernet product) at \$945 and LANdecoder for Token-Ring at \$1195.

My second diagnostic aid would be a cable checker for examining the network's physical level. The \$995 Quick Scanner from Microtest (800-526-9675, 602-957-6400), for instance, can help you spot bad cables and connectors and substandard connections. It's a capable and economical product.

I'd also put aside a few hundred dollars for PC internal diagnostic software, such as TouchStone's CheckIt PRO, DiagSoft's QA Plus, or Dariana's System Sleuth Professional.

It's important to know when and how to use these three types of tools. Specifically, you should spend a lot of time with these products when the network is working right, building a baseline of information that will be invaluable when something goes wrong.

Your toolbox doesn't have to be big or expensive. Substituting parts and comparing existing conditions with a baseline of proper performance will serve as your best troubleshooting procedures.—*Frank J. Derfler, Jr.*

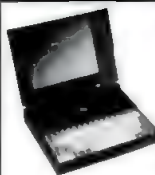
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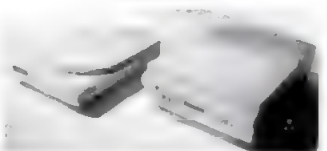
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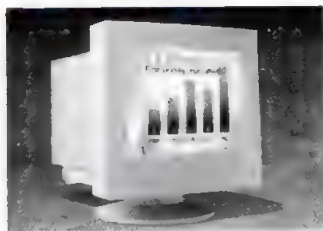
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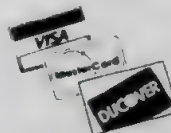
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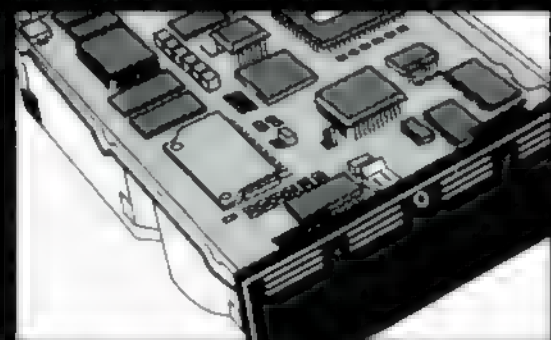
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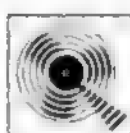
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340MB	13ms	CFA340A	\$299
540MB	10ms	CP30544	\$569
SCSI			
540MB	10ms	CP30540	\$579
1060MB	9ms	CFP1060S	\$939

digital

SCSI			
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SCSI			
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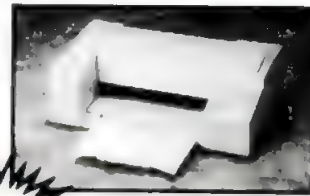
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- Digital-Quality, Compact Speakers
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- 101-Key Enhanced Keyboard

- High-Resolution, 3-Button Mouse
- Full-Tower Case
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486DX-33 \$2769

#006616

486DX2-50 \$2849

#006617

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AD#G0201

MidWest Micro

Elite 486SX/DX Notebook

SL-Enhanced Processor
Up to 340 Mb HD
PCMCIA Type III



A Dream Come True

Almost every ancient Egyptian dreamed of having a portable computer. Thanks to the 486SX/DX Notebooks, their dreams can come true for you.

These Elite Notebooks feature Intel's "SL-Enhanced" microprocessors, delivering excellent power management and a long battery life. The centerpiece of SL Technology is the System Management Mode (SMM), which allows your Notebook to slow down, suspend or completely shut down various components of your system.

The 486SX/DX Notebooks come with a divine gift—the gift of choice. Depending on your specific needs, choose from a 120, 200

or 340 Mb hard drive, an upgradeable 486SX-25, 486DX-33, 486DX2-50 or 486DX2-66 processor and a large 10" monochrome, dual-scan color or active-matrix color screen.

Elite's 486SX/DX Notebooks also feature the latest PCMCIA technology. They all have a PCMCIA Type III slot, which accepts two Type I cards, two Type II cards or one Type III

card. Use these cards to add memory enhancements, network adapters, modems and more.

Buy the notebook ancient Egyptians only dreamed of—order your Elite 486SX/DX Notebook today.

120 Mb	486SX-25	486DX-33	486DX2-50	486DX2-66
Monochrome	#005501 \$1439	#005516 \$1639	#005531 \$1649	#005546 \$1839
Dual-Scan Color	#005506 \$1999	#005521 \$2239	#005536 \$2249	#005551 \$2429
Active-Matrix Color	#005511 \$2969	#005526 \$3169	#005541 \$3179	#005556 \$3359

For a 200 Mb hard drive add \$100, For a 340 Mb hard drive add \$240

Treasures:

Processor:

Intel 486SX-25, 486DX-33,
486DX2-50 or 486DX2-66
SL-Enhanced upgradeable processor

RAM:

4 Mb, expands to 20 Mb

Hard Drive:

120 Mb, 200 Mb or 340 Mb

Screen:

10", 640 x 480 VGA resolution
Backlit display
Color - 256 colors
Monochrome - 64 gray shades

Battery Life*:

Active Color - 3 hours
Dual-Scan Color - 4 hours
Monochrome - 6 hours

Weight:

Color - 6.9 lbs.
Monochrome - 6.4 lbs.
512K DRAM with turbo bus
accelerated video technology
Simultaneous video on
active-matrix color and
monochrome units
86 keys with 101-key emulation
Built-in trackball

Built-in 1.44 Mb, 3.5" floppy drive

Advanced Power Management
One parallel and one serial port
External VGA and keyboard connectors
One PCMCIA Type III slot/ two
Type II slots
FREE AC adapter and utilities
disk
FREE MS-DOS 6.2 installed
FREE carrying case

Elite 486SX-25 SubNote

Ancient Egypt is known for great myths, historical treasures and powerful dynasties. You can discover another source of great power with Elite's 486SX-25 SubNote.

The 486SX-25 has the latest features, like Intel's "SL-Enhanced" processor, Advanced Power Management and PCMCIA technology.

It's a mystery how a little 3.9 lb. SubNote contains as much power as a desktop, but it does. The 486SX-25 comes with 4 Mb of RAM, expandable to 12 Mb, a fast 25 MHz processing speed and your choice of a 120, 200 or 340 Mb hard drive. It also delivers excellent 640 x 480 VGA resolution on its 10" high-contrast screen producing clear, concise images that even a mummy can easily see!

Elite's unforgettable SubNote symbolizes power, ground-breaking technology and true portability. Before you hop on your camel to start your next historical journey—call MidWest Micro and order the 486SX-25.



Treasures:

Processor:

Intel 486SX SL-Enhanced processor

Processing Speed:

25 MHz

RAM:

4 Mb expands to 12 Mb

Hard Drive:

120 Mb, 200 Mb or 340 Mb

Screen:

10", 640 x 480 VGA resolution
Backlit display
64 gray shades

Battery Life*:

5 hours

Weight:

3.9 lbs.

512K DRAM with turbo bus
accelerated video technology
Simultaneous video

83 keys with 101-key emulation

Built-in trackball

External 1.44 Mb, 3.5" floppy drive

Advanced Power Management

Nickel metal hydride battery

One parallel and one serial port

External VGA and keyboard connectors

One PCMCIA Type II slot

FREE AC adapter and utilities disk

FREE MS-DOS 6.2 installed

FREE carrying case

486SX-25 SubNote

120 Mb #005576 \$1439

200 Mb #005577 \$1539

340 Mb #005578 \$1679

Elite 486SLC2-50 Color/Monochrome Notebook

Discover the riches of the land with your Elite 486SLC2-50 Notebook. This portable is perfect for long journeys due to its compact size and energy-saving SUSPEND/RESUME feature. You can even compute up to six hours on a single charge!

Available in color or monochrome, the Elite comes with a fast 50 MHz processor, internal cache memory and up to 8 Mb of RAM—giving you more power for your money!

Both 486SLC2-50 models have a record of unparalleled success in eliminating distortion and eyestrain with their non-glare VGA screens. Images appear at up to 640 x 480 resolutions in 64 gray shades or 256 colors revealing eye-catching text, graphics and hieroglyphics.

Your Elite's LCD panel lets you know which drives are being accessed, when battery power is low, what function keys are enabled, whether external power is being used and if there is a modem ring. All the information you desire is right before your eyes!

The wait is over for both you and the Pharaohs. Your Elite Notebook is here—and it's just a toll-free phone call away.



Treasures:

Processor:

Cyrix 486SLC2-50

Processing Speed:

50 MHz

RAM:

2 Mb RAM, expands to 8 Mb

Hard Drive:

120 Mb or 200 Mb

Floppy Drive:

Built-in 1.44 Mb 3.5"

Screen:

Color - 9", 256 colors
Monochrome - 10",
64 gray shades

Video RAM:

512K

Keyboard:

83 key with 101-key emulation
2-button thumbball mouse

Weight:

Color - 5.7 lbs. with battery
Monochrome - 5.4 lbs.
with battery

Battery Life*:

Color - 4 hours
Monochrome - 6 hours

640 x 480 resolution

Simultaneous video

Advanced Power Management

One parallel and one serial interface

External VGA monitor and key-

board connectors

FREE AC adapter, carrying case and
MS-DOS 6.2 installed

One year manufacturer's warranty

MidWest Micro

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1-800-682-7256

Fax: 1-800-562-6622

Monday-Friday: 9 a.m. to 7 p.m. Saturday: 10 a.m. to 4 p.m.



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	120 Mb	200 Mb
Color	#005476 \$1659	#005477 \$1739
Monochrome	#005482 \$1279	#005483 \$1349

*Battery life measured with Power Management enabled. Actual battery life may vary.

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- Simply call the toll free number provided and buy the program (at deep discounted prices) with a credit card
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Only a technologically advanced company can build in Remote diagnostics and a Send/Receive Modem/Fax with every system

Every Expotech computer is equipped with a modem and special software that will let us access your computer, diagnose the hardware and solve the problem. *All from the comfort of your own telephone.*



Standard Features

- Pentium Technology ready
- Local Bus Graphics Accelerator with 1 MB
- Desktop Metal Case
- 5.25" and 3.5" floppy drives
- Remote Diagnostics Software
- 9600/2400 send/receive Fax/modem
- Anti-Virus Software
- Multi I/O - 2 Serial and 1 Parallel
- High performance-Tactile Keyboard
- MS-DOS 6.2, Windows 3.1



System 1

- All Standard Features+
- Intel 486SX25
- 210MB hard drive
- 4MB RAM
- 14" .28 non-interlaced monitor

\$1149

System 2

- All Standard Features+
- Intel 486SX33
- 210MB hard drive
- 4MB RAM
- 14" .28 non-interlaced monitor

\$1199

System 3

- All Standard Features+
- Intel 486DX33
- 340MB hard drive
- 4MB RAM
- 14" .28 non-interlaced monitor
- With 128k cache

\$1499

System 4

- All Standard Features+
- Intel 486DX2/50
- 424MB hard drive
- 4MB RAM
- 14" .28 non-interlaced monitor
- With 128k cache

\$1599

System 5

- All Standard Features+
- Intel 486DX2/66
- 424MB hard drive
- 8MB RAM
- 15" .28 non-interlaced monitor
- With 128k cache

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Popular Options

■ 4, 8, or 16MB RAM ■ 15" .28 non-interlaced monitor ■ 17" .28 non-interlaced monitor ■ Combo floppy drives



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REMOTE DIAGNOSTICS	YES			YES	
24 HOUR TOLL FREE SUPPORT	YES		YES	YES	YES
FREE ON-SITE SERVICE	YES	YES	YES	YES	YES
OPEN 7 DAYS A WEEK	YES	YES	YES	YES	
EXPRESS PARTS SERVICE	YES	YES	YES	YES	
FAX TO ORDER & ASSEMBLY	YES	YES	YES	YES	
SYSTEM FEATURE	DELL	Gateway	2300	COMPAQ	HP
ANTI-VIRUS SOFTWARE	YES				
FREE FAX MODEM	YES				
SERVICE VALUE RATING	★ ★ ★ ★ ★	★ ★ ★ ★ ★	★ ★ ★ ★ ★	★ ★ ★ ★ ★	★ ★ ★ ★ ★
INTERNETWORKING AUG. 1993	★				

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by **VTECH™**

Choose VESA Performance



**3 YEAR
WARRANTY**

Standard Features

- Intel Pentium Technology ready
- 2 VESA expansion slots
- VLB Graphics Accelerator with 1 MB RAM
- Desktop Metal Case
- 3.5" floppy drive
- Remote Diagnostics Software
- 9600/2400 send/receive Fax/modem
- Anti-Virus Software
- Multi I/O - 2 Serial and 1 Parallel
- High performance-Tactile Keyboard
- MS-DOS 6.2, Windows 3.1

Vesa Local Bus Systems

If you're after high speed Windows performance, the VESA local bus systems from Expotech deliver. By using the latest in VESA local bus technology these systems blow away the competition at prices that prove Expotech is the value leader.

By using the tremendous manufacturing resources of VTech, Expotech can deliver high quality products at the lowest possible cost. Expotech is the only choice when the bottom line is getting the most for your money.

Two VESA local bus slots are provided plus our high speed graphics accelerator make the VESA system from Expotech the highest value VLB system available.

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- 4MB RAM
- 14" .28 non-interlaced monitor

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System 2

■ All Standard Features+

- Intel 486DX33
- 340MB hard drive
- 4MB RAM
- 14" .28 non-interlaced monitor
- With 128k cache

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System 3

■ All Standard Features+

- Intel 486DX2/50
- 424MB hard drive
- 4MB RAM
- 14" .28 non-interlaced monitor
- With 128k cache

\$1699

System 4

■ All Standard Features+

- Intel 486DX2/66
- 424MB hard drive
- 8MB RAM
- 14" .28 non-interlaced monitor
- With 128k cache

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System 5

■ All Standard Features+

- Intel 486DX2/66
- 527MB hard drive
- 16MB RAM
- 15" .28 non-interlaced monitor
- With 128k cache

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Popular Options

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Standard Features

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- Desktop Metal Case
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- Double speed CD ROM
- Stereo speakers
- Stereo sound board
- High performance keyboard
- MS-DOS 6.2, Windows 3.1
- AD-lib, MPC compatible
- Sound blaster compatible
- Compton's Interactive Encyclopedia
- Webster's Dictionary
- World Atlas



BEST BUY ▼

System 1

- All Standard Features+
- Intel 486SX25
- 250MB hard drive
- 4MB RAM
- 14" .28 non-interlaced monitor

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System 2

- All Standard Features+
- Intel 486SX33
- 250MB hard drive
- 4MB RAM
- 14" .28 non-interlaced monitor

\$1499

System 3

- All Standard Features+
- Intel 486DX33
- VLB accelerated graphics
- 340MB hard drive
- 4MB RAM
- 14" .28 non-interlaced monitor
- With 128k cache

\$1799

System 4

- All Standard Features+
- Intel 486DX2/50
- VLB accelerated graphics
- 424MB hard drive
- 4MB RAM
- 15" .28 non-interlaced monitor
- With 128k cache

\$1999

System 5

- All Standard Features+
- Intel 486DX2/66
- VLB accelerated graphics
- 424MB hard drive
- 8MB RAM
- 15" .28 non-interlaced monitor
- With 128k cache

\$2299

Popular Options ■ 4, 8, or 16MB RAM ■ 15" .28 non-interlaced monitor ■ 17" .28 non-interlaced monitor
■ Combo floppy drives

- Bulletin board service. Download drivers and talk to techs on line
- Visa,

- Corporate leasing available
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Multi-Media Systems

Multi-Media systems can really turn your computer into a complete information resource for you and your family. Stereo sound and full motion video, interactive encyclopedia, educational software and games really come to life.

VTech has been building complete multi-media systems for years and we know what it takes to get all system components working together. Your VTech system will arrive completely setup and ready to run. The VTech multi-media systems all feature double speed CD-ROM drives that double the data throughput and really enhance video and audio performance of today's multi-media software. The VTech sound board provides a full 20 voices rather than the usual 11 or 16 voices the other manufacturers provide.

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VTECHTM PlatinumTM

The VTech Platinum 486 SMP systems are the fulfillment of a long standing desire to build a desktop computer that alters the commonly accepted perceptions of a standard desktop computer.

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WARRANTY

Platinum Upgrade Options

Dual
Pentium Overdrive

Single
Pentium Overdrive

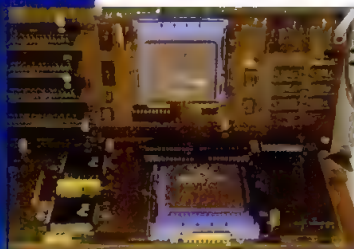
Dual
486DX2/66

Single
486DX2/66

The most advanced 486 system available

Advanced technology makes the difference.

The VTech Platinum 486 computers are the fastest, most powerful systems available. Imagine a system so fast it can keep up with Dual Symmetrical Multiprocessing PentiumTM Overdrive processors and you'll understand why the VTech Platinum single processor 486 system outperforms all other systems on the market.



Each VTech Platinum 486 is designed with an exclusive copy back cache with cast-out buffering, high performance memory design, VESA Local Bus slots, two cooling fans, on board SCSI II, and self-sensing setup all managed by the industry's most advanced BIOS.

These are just a few of the advanced technology features that make the VTech Platinum computers the highest performing systems available.

The benefits are high performance, ease of use and more upgradability - your system will perform better, work harder and last longer.

The VTech difference

Because we control the complete design and manufacturing process, we can control the quality of our systems. VTech has been an OEM provider to some of the largest names in the business, companies that demand quality and depend on VTech.

We stand behind this commitment of quality with a 3 year warranty and the best customer support in the business. VTech is a name you can depend on.

Upgradability

As your needs change and new software pushes the limits of today's hardware, the VTech Platinum systems can be expanded to meet the challenge.

VTech provides you with three upgrade paths. From the single processor Platinum 486 you can upgrade to dual 486 processors, a single Pentium OverdriveTM processor, or for the ultimate in power and performance, dual Pentium OverdriveTM processors.

The VTech Platinum 486 is the only desktop computer that is Pentium OverDrive Ready and Symmetrical Multiprocessor ready. No more worrying about obsolescence - the VTech Platinum gives you the high performance you need today and the upgradability you'll need tomorrow.

Whether you start with the VTech Platinum 486 Single Processor or choose an SMP Dual Processor System, you're getting the most advanced computer system available.

The bottom line

The VTech Platinum 486 SMP delivers the performance you need for today's software and is unique in its ability to expand to meet the demands of tomorrow's high performance software and operating systems.

Compare these features anywhere and you'll see why the VTech Platinum has already received top recognition from industry experts.

The bottom line - *the VTech Platinum is the best value in high performance computers.*

"VTech delivers a fast multiprocessor system at a single processor price." *Computer Shopper*,

VTech Platinum is SMP ready

The experts agree, your next system should be multiprocessor ready. As *PC Week* said on August 23, 1993, "Multiprocessing is clearly the wave of the future".

The VTech Platinum system features a unique, patented design that brings true Symmetrical Processing capabilities to the desktop. As *PC Magazine* said on October 12, 1993, "VTech leads in PC Multiprocessing".



With Microsoft Windows NTTM the VTech Platinum SMP is an efficient way to double your power. Like a two lane highway that suddenly becomes four lanes, processing flows with greater ease and efficiency.



The VTech Platinum 486 delivers power, performance, upgradability at prices you would expect to pay for basic systems.



VTECHTM Technology you can afford

...Only from Vtech

486DX2/50 single

- Intel 486DX2/50 Processor
- Pentium Overdrive™ ready
- SCSI II (on board)
- 256k Cache
- VESA Local Bus
- S3 Windows Accelerator Video Card w/1MB RAM
- 8MB System RAM
- 3.5" Floppy Drive
- 424MB Hard Drive
- 16550 Serial Port Controllers
- 15" 28 Non-Interlaced Monitor
- MS DOS 6, Windows 3.1
- High Resolution Mouse

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Options

- 17" 28 Monitor ■ CD ROM Upgrades ■ Increased RAM ■ High Speed 14.4 Modems ■ Combo Floppy Drives ■ Multi-Media kit

486DX2/66 single

- Intel 486DX2/66 Processor
- Pentium Overdrive™ ready
- SCSI II (on board)
- 256k Cache
- VESA Local Bus
- S3 Windows Accelerator Video Card w/1MB RAM
- 12MB System RAM
- 3.5" Floppy Drive
- 424MB Hard Drive
- 16550 Serial Port Controllers
- 15" 28 Non-Interlaced Monitor
- MS DOS 6, Windows 3.1
- High Resolution Mouse

\$2499

486DX2/66 plus

- Intel 486DX2/66 Processor
- Pentium Overdrive™ ready
- SCSI II (on board)
- 256k Cache
- VESA Local Bus
- S3 Windows Accelerator Video Card w/1MB RAM
- 16MB System RAM
- Double Speed CD-ROM
- 3.5" Floppy Drive
- 424MB Hard Drive
- 16550 Serial Port Controllers
- 15" 28 Non-Interlaced Monitor
- MS DOS 6, Windows 3.1
- High Resolution Mouse

\$2999

486DX2/66 dual

- 2 Intel 486DX2/66 Processors
- Pentium Overdrive™ ready
- SCSI II (on board)
- 256k Cache
- VESA Local Bus
- S3 Windows Accelerator Video Card w/1MB RAM
- 16MB System RAM
- Double Speed CD-ROM
- 3.5" Floppy Drive
- 527MB Hard Drive
- 16550 Serial Port Controllers
- 15" 28 Non-Interlaced Monitor
- MS DOS 6, Windows 3.1
- High Resolution Mouse

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Twice the Power, Performance & Expandability

Specifications

Processor

- Intel 486DX2/50 or 486DX2/66
- ZIF processor socket - Pentium Overdrive™ ready

Optional Multiprocessor

- MP Power Card with a second Intel 486DX2/50 or 486DX2/66 processor

Secondary Cache

- 256k Cache (Copy back w/cast out buffering)

Memory

- Supports 4, 8, 16 or 32MB SIMMS
- Four 72 pin SIMM sockets support 36 bit JDEC style SIMMS which may be inserted in any configuration

Bus Slots

- Six (6) ISA Slots
- Two (2) VESA VL Slots
- One (1) MP Connector Slot

Ports

- Two (2) serial ports: 16550-D80
- One (1) parallel port ECP-D825
- PS/2 mouse port
- IDE port-floppy controller
- SCSI II connector on board

Chassis

- Height 6.5" Width 16.6" Depth 17.1"
- Supports three 5.25" or 3.5" external drive bays and one 3.5" internal hard disk drive

Advanced BIOS

- Supports multiprocessing start-up for advanced SMP capable operating system (Windows NT)
- Automatically detects and reports all processors installed and active
- Flexible memory configuration supports 288MB floppy drives
- Ability to autotype IDE hard disk
- Built-in Adaptec SCSI II support
- Two level password protection

Introducing Pentium. The newest addition to the Platinum series

Standard Features

- Intel 60MHz Pentium processor
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- Window's accelerator with 1MB expandable to 2MB
- Dual cooling fans
- Advance BIOS with 2.88MB floppy drive support
- Energy saving functions utilizing Intel System Management mode
- Two fast serial ports (16550 support)
- Enhanced parallel port
- Enhanced capabilities port
- Supports Vtech Mezzanine board (business audio, networking and modem)
- 3.5" floppy drive
- PCI SCSI II processor on board (optional)
- Self sensing set-up
- High performance-tactile keyboard
- MS-DOS 6.2, Windows 3.1

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Platinum P5-60

- All Standard Features+
 - 424MB hard drive
 - 8MB RAM
 - Double speed CD-ROM
- \$2995**

Popular Options

- 4MB, 8MB, 16MB or 32MB RAM
- 17" non-interlaced monitor
- Combo floppy drives

Platinum P5-60

- All Standard Features+
 - 527MB hard drive
 - 16MB RAM
 - Double speed CD-ROM
 - 17" non-interlaced monitor
- \$3995**

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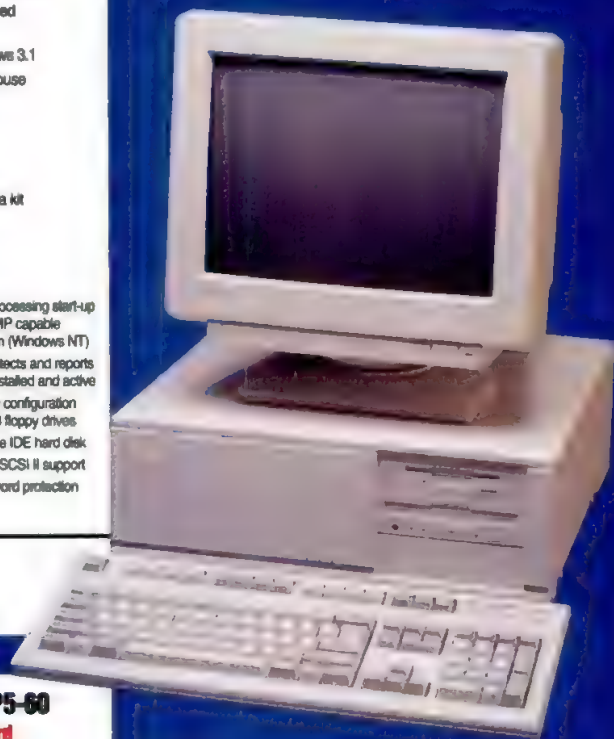
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No one else can offer you so much value, dependability and support... Only

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expotech
by vtech

VTECH™
Platinum™



MEMORY • MEMORY

SIMM MODULES

1 x 9 (3-chip)	\$43
4 x 9	119
1 x 36	181
2 x 36	254

Apple Type	IBM Type
1MB x 8-70	1 x 9-70ns (9 chip)
4MB x 8-70	1 x 9-80ns Static Cal.
1 x 37 70ns	512K x 36 (2MB)
2 x 37 70ns	4MB x 36 (16MB)

LASER PRINTER MEMORY

Brother HL-4	2MB 420	\$147	4MB 440	\$225
Brother HL-50, HL-84, HL-8	1MB 810	\$80	2MB 820	\$120
Brother HL-100/104	2MB 1040	\$119	4MB 1040	\$189
Canon LBP-45L	1MB 803-0010-000	\$100	2MB 803-0020-000	\$189
Canon LBP-4, 414e, 414ps	1MB 563-2230	\$106	2MB N/A	\$145
Canon LBP-81, 81R, 81T	2MB 563-1880	\$111	4MB N/A	\$189
Canon LBP-III, III Plus	2MB 563-2350	\$145		
Compaq PAGERA 15, 20	4MB 126360-001	\$194	8MB 126361-001	\$376
Epson LPT-4000	2MB 185-001	\$120	4MB N/A	\$198
Epson Actiwriter II, EPI-8000	2MB N/A	\$135	4MB N/A	\$213
Epson EPI-7500	2MB C222051	\$124	4MB C222021	\$235
HP LaserJet II	1MB C20244	\$47		
HP LaserJet HP, HP, HP, HP	2MB 334758	\$97	4MB 334778	\$170
HP LaserJet II, 100	2MB 334448	\$110	4MB 334458	\$195
HP LaserJet II, 4, 4M, 4S, 454M, 41300, Desktop 1200c	1MB C2043A	\$39	2MB C2044A	\$76
HP LaserJet II, 4, 4M, 4S, 454M, 41300, Desktop 1200c	1MB C2043A	\$181	2MB C2044A	\$354
HP LaserJet II, 4, 4M, 4S, 454M, 41300, Desktop 1200c	2MB 227078	\$40		
HP DesignJet 600 Inkjet Printer	4MB C2065A	\$181	8MB C2066A	\$354
IBM/Lanmark Laser 4019, 4019i	2MB 118333A	\$96	4MB 118333S	\$157
IBM/Lanmark Laser 4019, 4019i	2MB 1037137	\$115	3.5MB 103847S	\$173
IBM/Lanmark Laser 4039, 4039i All Models	4MB 1328363	\$167	8MB 1328365	\$326
Myrica PS-1500A Escops	2MB N/A	\$141	4MB N/A	\$182
Myrica PS-2500A Escops	1MB N/A	\$45	4MB N/A	\$167
NEC StampWriter PS 8.97 series	2MB N/A	\$100		
OnLine 800	1MB 7001701	\$67	2MB N/A	\$106
OnLine 800, 801	2MB N/A	\$157	4MB N/A	\$190
OnLine 810	1MB 70021001	\$93	2MB 70021101	\$132
OnLine 830, 840	2MB 70016501	\$126		
Panasonic LaserPartner 4410, 4430	2MB KX-P444	\$113	4MB N/A	\$191
Panasonic LaserPartner 4430, 4420	2MB KX-P441	\$129	4MB N/A	\$189
Panasonic LaserPartner 4455	2MB KX-P442	\$149		
Texas Instruments MicroLaser XL	1MB 2555739-0001	\$46		
Toshiba Page Laser 6	2MB L54-N00090	\$120	4MB L54-N00100	\$190

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PacificPage PE	\$279
PacificPage PE/LJ includes 4 MB HP, II, III, HP, HP	\$749
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Pacific Connect II (254K) 5 parts II, III, HP, HP	\$329
Pacific Connect II (254K) 7 parts HP, HP	\$489
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Proxima	4MB 501159-001	\$152	8MB 501159-002	\$349	AMRRA Enterprise 386, 486, 586, 686, 786, 886, 986 (all models)	2MB N/A	\$329	
4MB 501159-003	\$709	32MB 501159-004	\$1294	AMRRA Enterprise 486, 586, 686, 786, 886, 986 (all models)	4MB N/A	\$459		
Membrane 1MB	16MB 501143-001		\$735	PS/1 286, 386SX	2MB 929935	\$87	4MB 929934	\$168
Bravo 386 SX, W5, 286, 386	2MB 500510-002	\$94	4MB 500510-008	\$169	PS/1 Consultant, Essential, Expert models x43, x44, x45	4MB 9467291	\$639	
Bravo 3/25	2MB 500710-004	\$96	8MB 500824-002	\$319	PS/1 Consultant, Essential, Expert models x76	16MB 949291	\$639	
Advantage! Plus 486/33, 50/33, 60/33, 80/33	4MB 500510-008	\$148	8MB 500824-001	\$319	PS/1 Consultant, Essential, Expert models x76	16MB 949291	\$639	
Advantage! 386SX/25, 386SX/33, 386SX/40, 386SX/50	2MB 500942-001	\$89	4MB 500942-002	\$289	PS/2 25/286, 30/286, memory adapter 1497259	2MB 9450129	\$81	
Advantage! Pro 486/33, 50/33, 60/33, 80/33, 100/33	2MB 500987-001	\$59	4MB 500987-002	\$159	PS/2 355X, 405X, 555X, 655X, 755X, 855X, 955X, 1055X, 1155X, 1255X, 1355X, 1455X, 1555X, 1655X, 1755X, 1855X, 1955X, 2055X, 2155X, 2255X, 2355X, 2455X, 2555X, 2655X, 2755X, 2855X, 2955X, 3055X, 3155X, 3255X, 3355X, 3455X, 3555X, 3655X, 3755X, 3855X, 3955X, 4055X, 4155X, 4255X, 4355X, 4455X, 4555X, 4655X, 4755X, 4855X, 4955X, 5055X, 5155X, 5255X, 5355X, 5455X, 5555X, 5655X, 5755X, 5855X, 5955X, 6055X, 6155X, 6255X, 6355X, 6455X, 6555X, 6655X, 6755X, 6855X, 6955X, 7055X, 7155X, 7255X, 7355X, 7455X, 7555X, 7655X, 7755X, 7855X, 7955X, 8055X, 8155X, 8255X, 8355X, 8455X, 8555X, 8655X, 8755X, 8855X, 8955X, 9055X, 9155X, 9255X, 9355X, 9455X, 9555X, 9655X, 9755X, 9855X, 9955X, 10055X, 10155X, 10255X, 10355X, 10455X, 1055X, 10655X, 10755X, 10855X, 10955X, 11055X, 11155X, 11255X, 11355X, 11455X, 1155X, 11655X, 11755X, 11855X, 11955X, 12055X, 12155X, 12255X, 12355X, 12455X, 1255X, 12655X, 12755X, 12855X, 12955X, 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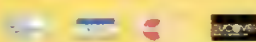
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IBM vs. HP

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Printspeed	10ppm	8ppm
PostScript	YES	(Optional)
Resolution	600DPI	600DPI
Upgradable Language	YES	NO
Available Duplex Option	YES	NO
MCW Price	\$1339	\$1368

And the Winner is The 4039-10R from IBM!

IBM vs. HP

	4037-5E	LaserJet 4L
Printspeed	5ppm	4ppm
Paper Input	150 Sht.	100 Sht.
Optnl. 2nd Drwr	YES	NO
Fonts	40	26
MCW Price	\$655	\$674

And the Winner is The 4037-5E from IBM!

IBM
LEXMARK

IBM vs. HP

	Execjet II 4076	Deskjet 500
Paper Capacity	150 Sht.	100 Sht.
Resolution	600x300	300x300
Cart. Life	1000 pgs.	500 pgs.
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Res. Enhncmnt.	YES	NO
MCW Price	\$279	\$309

And the Winner is The Execjet from IBM!

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*Ltr, Lgt. Commercial 610

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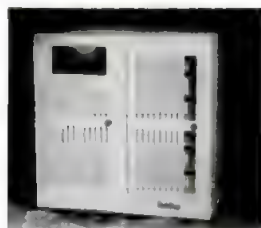
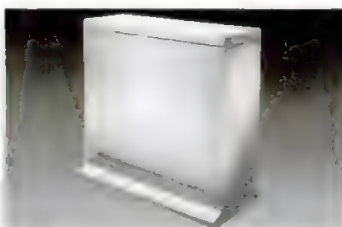
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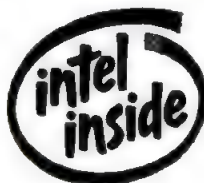
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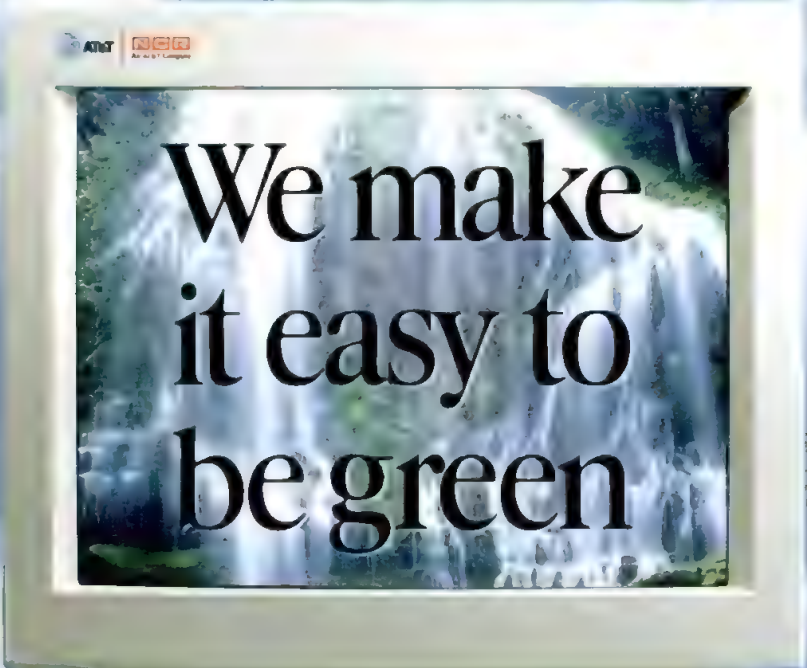
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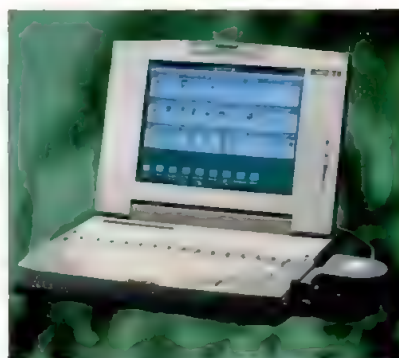
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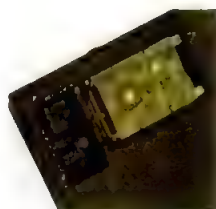


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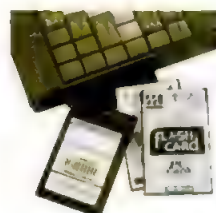
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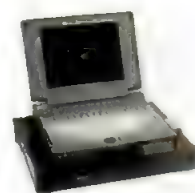
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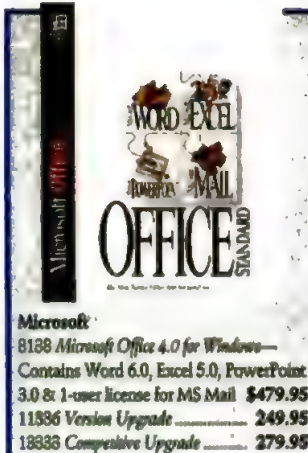
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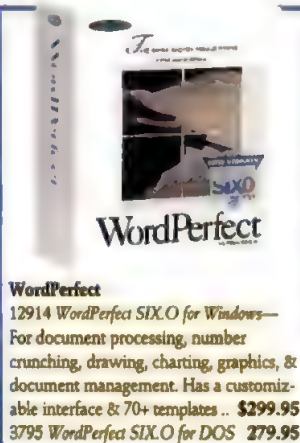


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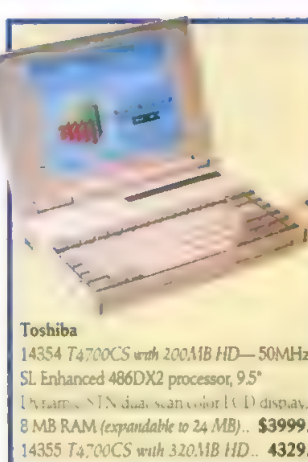
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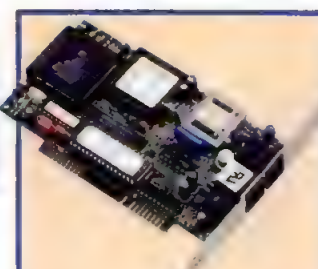
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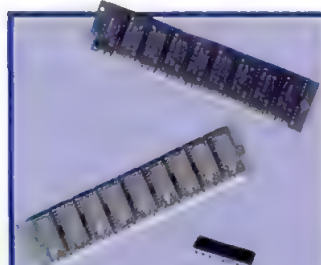
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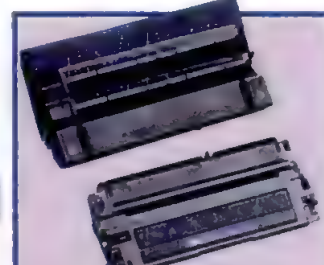
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Dot Pitch	N/A	.28mm	.28mm	.28mm	.26mm
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MPR II Complaint	No	No	Yes (as option)	Yes	Yes
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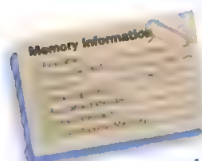
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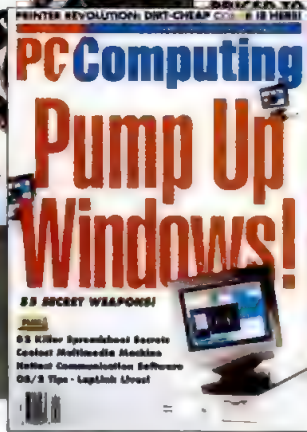
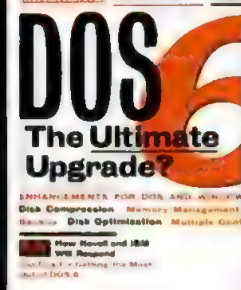


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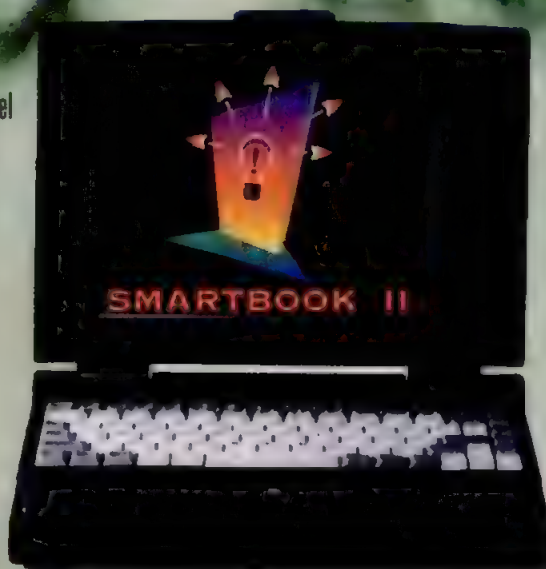
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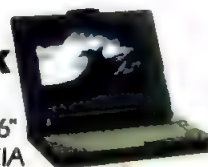
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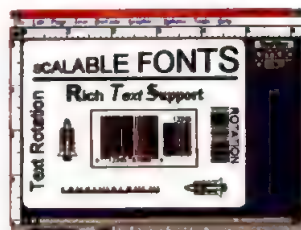
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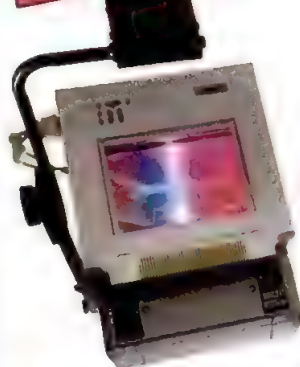
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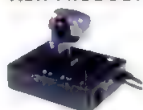
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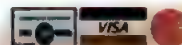
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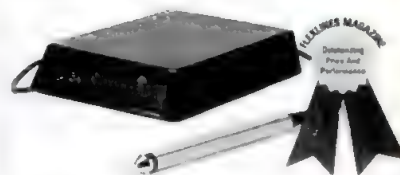
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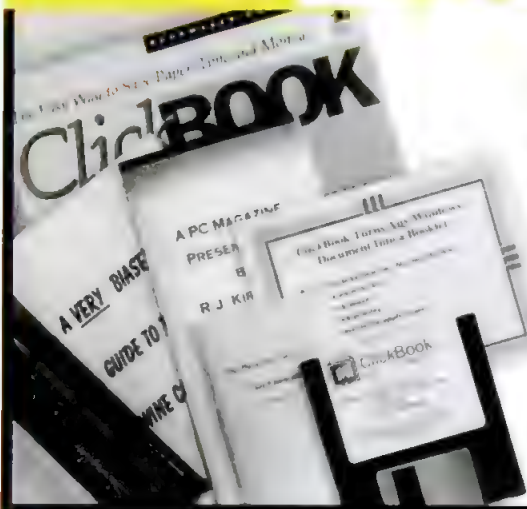
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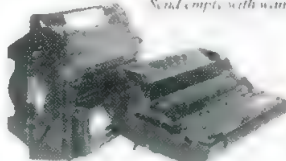
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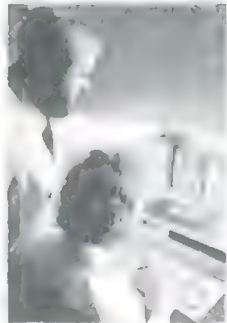
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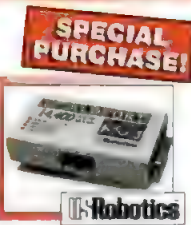
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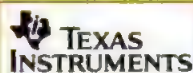


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Data Compression (V.42bis, MNP 5)	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			
i80186 Fax Coprocessor								✓		✓		✓			
UART Buffering	✓		✓					✓		✓		✓			
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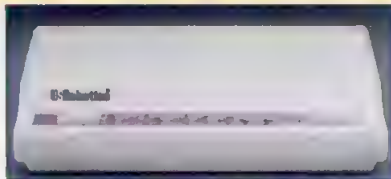
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Coming Up

The World of CD-ROM

Going Mainstream Once considered a luxury, CD-ROM drives are becoming more and more of a necessity for any personal computer. In this comprehensive review we detail our test results of CD-ROM throughput, text searches, TIFF image file load, multimedia playback, and audio quality for 26 single-, double-, triple-, and quadruple-speed drives. Some excellent performers are priced surprisingly low.

Kodak Photo CDs Photo CDs aren't just for viewing your wedding photos on a monitor. With Photo CDs' extensible format and wide range of applications, imaging professionals are flocking to this technology. We take a look at the ins and outs of Photo CD technology and what's behind all the fuss.

CD-ROM on a LAN It seems like the perfect combination. But establishing CD-ROM access for users over a network is no simple matter—at least not right now. We summarize the approaches available to you and look at a few representative products that get you there. Despite hardware and software compatibility issues, the popularity of CD-ROM—particularly as a software delivery tool and as a great medium for multimedia data—is sure to mean increased activity in this market.

PowerPC: Your Next CPU?

Motorola, IBM, and Apple would like you to believe that their new line of PowerPC RISC microprocessors is a valid alternative to x86 computing. These chips are faster, cheaper, and cooler than the Pentium, they claim, and will run a whole list of mainstream operating systems. Will your next computer system be PowerPC-based?

Multimedia Authoring

As CDs proliferate, the tools for creating multimedia content are finding their way into new hands. Whether you're creating a shopping-mall kiosk or a computer-based training application, professional authoring packages offer the tools to get the job done. *PC Magazine* examines five products that help you create rich multimedia presentations.

The Need for Speed

Of all the enhancements you can make to speed up Windows, few have the potential to increase performance like an accelerated video card. Using a small Windows program, Tutor columnist Jeff Proise demonstrates just how accelerated video cards give you so much bang for so little buck.

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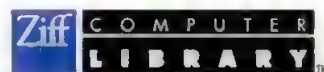
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After Hours

Crosswords: Lyriq Crosswords, Premium Edition; The New York Times Crossword Puzzles; Puzzle Master; Take A Break! Crosswords for Windows; **Games:** SimFarm; **CD-ROM Pick Hit:** Dracula Unleashed; **Edutainment:** The Musical World of Professor Piccolo; **Ideas:** Creative Whack Pack; **Spotlight on Hardware:** Game Blaster

CROSSWORDS

A Ten-Letter Word For Fun: Crosswords

BY ERIC BERLIN

Crossword puzzles have made the jump from the newspaper page to the computer screen. While it may be difficult to do these puzzles over a morning cup of coffee, there are enough advantages to computer crosswords to warrant a serious look: Try getting the newspaper to offer a needed hint, for instance. With about 250 puzzles per package,

there's a greater selection, too. To heat things up further, try the tournament simulators found in each package.

In this roundup, we look at four programs. Three use the Windows interface and include puzzles from such diverse sources as *The New York Times* and Penny Press. Centron's Puzzle Master is your best DOS option.

Lyriq Crosswords, Premium Edition (\$29.95). The most thoughtfully designed crossword program in this group of products, Lyriq's Premium Edition for Windows, with its laundry list of helpful options, is also the least expensive and contains the widest variety of puzzles: 260 of them, chosen from such

sources as *The Washington Post*, Penny Press, and *Crossword* magazine.

Lyriq's most thoughtful feature is its fine list of navigation options, which make it easy to get around the grid. To fit the largest puzzles on the screen, Lyriq shrunk them down and eliminated the clue numbers. A quick-key combination zooms in on a section of the grid if need be.

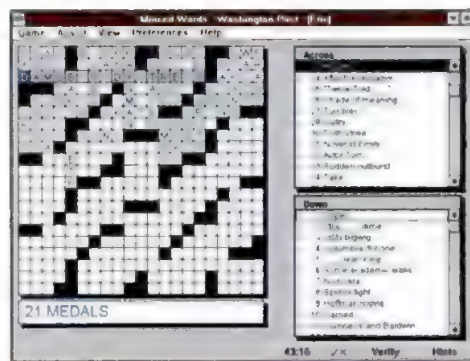
An assortment of hinting options lets you verify answers either letter-by-letter or word-by-word. You can even cheat, except in the strict tournament mode, which not only disallows any hints but also grabs your puzzle away at the time limit.

The only thing wrong with Lyriq is its auto-save feature, which works too well: If you're doing miserably on a particularly difficult grid, there's no simple way to start over.

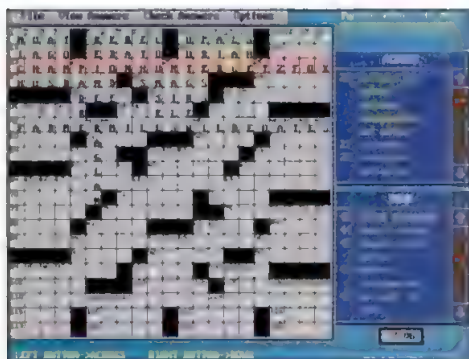
Lyriq publishes and distributes 25 additional puzzles on disk every month for a fee of

\$62 for a year or \$32 for six months. For puzzle variety and ease of use, there's no better choice.

The New York Times Crossword Puzzles (\$49.95). Swfte International presents 250 *New York Times* crossword puzzles for Windows.



NO NUMBERS? Lyriq fits a full Sunday puzzle on the screen but moves the numbers out of the grid for better readability.



CLASSIC CHALLENGE: Centron (shown) and Swfte provide *New York Times* crossword puzzle fans with DOS and Windows options.

You can't beat the content, but using the program can be as puzzling as the puzzles.

The major problem is interface: The pencil icon doesn't make it clear if the next answer will go across or down; rather, the right mouse button toggles between the two. You'll also tire quickly of double-clicking on a word in order to solve it. Admittedly, you could get used to this interface; it could simply be a lot easier.

FACT FILES

Lyriq Crosswords, Premium Edition, \$29.95. Requires: 4MB RAM, Windows 3.x, 1.1MB hard disk space. Lyriq International Corp., 1701 Highland Ave., #4, Cheshire, CT 06410; 800-433-4464, 203-250-2070; fax, 203-250-2072. Circle 476 on reader service card

The New York Times Crossword Puzzles, \$49.95. Requires: 4MB RAM, Windows 3.x, 1.5MB hard disk space. Swfte International Ltd., P.O. Box 219, Rockland, DE 19732; 800-237-9383, 302-234-1740; fax, 302-234-1760. Circle 477 on reader service card

Puzzle Master, \$49.95. Requires: 256K RAM, DOS 3.0 or later, 800K hard disk space. Centron Software Inc., 1500 Hwy. 15-501 N., Southern Pines, NC 28387; 800-848-2424, 919-692-2009; fax, 919-692-2173. Circle 478 on reader service card

Take A Break! Crosswords for Windows, Volumes 1 & 2, \$49.95. Requires: 4MB RAM, Windows 3.x, 1.5MB hard disk space. Dynamix Inc., 1600 Millrace Dr., Eugene, OR 97403; 503-343-0772; fax, 503-344-1754. Circle 479 on reader service card

After Hours

Puzzles are categorized by days of the week and get progressively harder from Monday to Saturday, as regular *Times* puzzlers know. There are also 50 Sunday puzzles. Unfortunately, you can view the full puzzles on the screen only by closing the clue windows.

Each puzzle can be played three ways: Novice, in which incorrect letters are simply not entered; Intermediate, which verifies answers as they're typed; and Expert, which offers no hints at all.

Puzzle Master (\$49.95). If you demand *The New York Times* but don't want the Windows interface, take a look at Centron Software's DOS package, *Puzzle Master*. Centron has made the puzzle, rather than the bells and whistles, the main feature of *Puzzle Master*. This DOS-based package of 250 *New York Times* crossword puzzles does an admirable job of fitting even the giant Sunday puzzles on the screen in one shot, something Swfte's handsomer competitor cannot claim.

There is only one level of play in *Puzzle Master*: a timed and scored tournament mode that is easily ignored if

it isn't your style. A solver can verify whether a given word or individual letter is correct, or even have the program reveal the correct answer when all else fails. These little tricks cost points; the entire scoring system, however, is adjustable, in case you don't want cheating to count against you. If you don't have Windows, *Puzzle Master* is your best choice.

Take A Break! Crosswords for Windows (\$49.95). Though this crossword program comes with a whopping 373 puzzles from *Dell* magazine, it's still easy to tell that Dynamix, a subsidiary of Sierra On-Line, did not think out its entry thoroughly enough.

Clearly, the company tried. *Take A Break!* looks great, although perhaps more attention was paid to Wanda, the animated sprite inhabiting the game, than to more important features like grid placement. While the largest crossword grids fit easily on the screen, the smaller grids are squished into a tinier-than-necessary box.

The basics of other crossword packages seem to have eluded Dynamix as well. There is no on-line help, and the wide variety of hints are al-

lowed only on the easiest of three levels of play (Apprentice, Puzzler, and Fanatic). A scoring system is also turned off during Fanatic mode.

The interface is somewhat disappointing, with its almost total reliance on the mouse, rather than the much easier arrow keys. And in a glaring

fault to some crossword connoisseurs, *Take A Break!* allows some puzzles with two-word answers, often a major no-no. True crossword fanatics are likely to bypass the needless animation provided in *Take A Break!* and look elsewhere. Or they'll just go out and buy the newspaper.

GAMES

SimFarm: Farming Without the Dirt

BY GAYLE C. EHRENMAN

Farming used to be back-breaking, messy work. Now it's neither, thanks to Maxis's *SimFarm*, the country cousin to the well-known *SimCity*. This DOS-based \$59.95 farming simulation lets you enjoy the fruits of your labor without getting dirt under your nails or mud on your boots.

Like its many Sim-siblings, *SimFarm* is as much a learning experience as it is a game. Here, you start and run a farm from the ground up, plowing the fields, planting the crops, harvesting

them and then trying to sell them in town.

If the crops fail, you can always turn to animal husbandry and try raising livestock. Don't forget to feed those cows, though, or they could very well break through your carefully placed fences and devour your fields.

Even in simulation form,



BUYING THE FARM: Tornadoes and other natural disasters sweep through *SimFarm*.

Dracula Unleashed: Interactive Movie with a Bite

Welcome to the world of the undead. Part interactive mystery, part horror movie, *Dracula Unleashed* takes you to London to investigate a series of mysterious deaths—ones that bear the mark of the vampire.

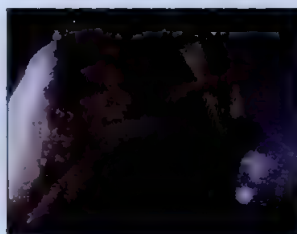
CD-ROM PICK HIT
Dracula Unleashed is similar to the series *Sherlock Holmes, Consulting Detective*, from Viacom New Media (formerly Icom Simulations). As you view each scene, you collect clues and objects and travel to several locations. This program features 96 minutes of full-motion video, plus 50 minutes of sound.

Based loosely on the Bram Stoker tale, *Dracula Unleashed* is laden with

detail, from costumes to sets, and harkens back more to Coppola's 1992 version than to the classic 1931 film that starred Bela Lugosi. This vampire, however, waits for your actions before he strikes.—Julie Cohen

Dracula Unleashed, \$69.95. Viacom New Media, 708-520-4440.

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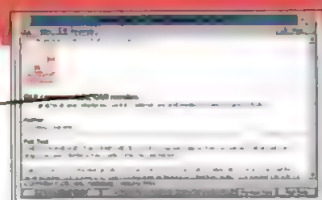
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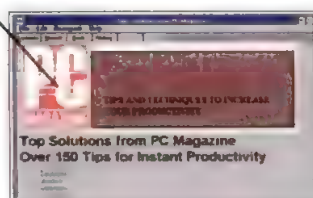
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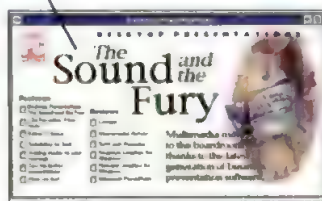
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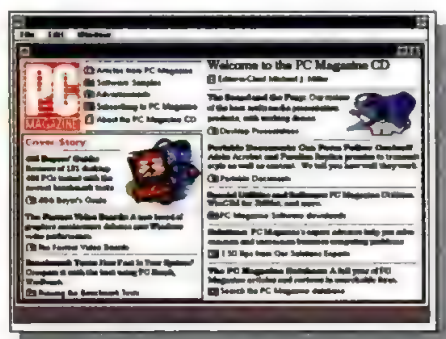
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After Hours

SimFarm

farming is a tough road to hoe. In this game, each of the 24 different crops has its own planting, growing, and harvesting needs, and Mother Nature doesn't always comply. Crops don't always thrive, farm machinery breaks down, natural disasters threaten your existence, and bankers come calling when you can't pay your loans on time.

You'll need to plan carefully to succeed at SimFarming, but you'll appreciate those dinner veggies all the more once you realize what it took to get them to your table.

SimFarm, \$59.95. Requires: 640K RAM, DOS 3.0 or later, 4MB hard disk space, mouse. Maxis, 2 Theatre Square, Orinda, CA 95463-3346; 510-254-9700; fax, 510-253-3736.

Circle 480 on reader service card

EDUTAINMENT

Professor Piccolo Teaches Kids Music in a Fun, Friendly Town

BY ASA SOMERS

Harold Hill would love to parade his 76 trombones through this River City. In The Musical World of Professor Piccolo, this town is dedicated to music appreciation. Stop by Symphony Hall to learn about orchestras. In the town church, you'll discover the historical influence of the church on Western music. You can even familiarize yourself with basic music theory at the music school.

At any given point, Professor Piccolo gives you help options and ways to exit or revert to the previous screen. Passing the cursor over any building re-

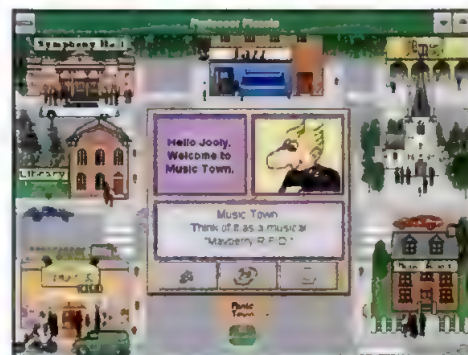
veals what you will find inside. The local rock club, for example, is jam-packed with information about the history of rock and roll, the most common instruments used in rock music, and basic rock song structure. Once the crowd quiets down, clicking on the electric guitar will play a sample solo. You can click on a book icon to read about the instrument's evolution.

The audio effects and colorful graphics make this program an

enjoyable learning tool. Trouble is, you have to share it with the kids.

The Musical World of Professor Piccolo, \$69.95. Requires: 4MB RAM, 4MB hard disk space, CD-ROM drive, Microsoft Windows 3.1. Opcode Interactive, 3950 Fabian Way, #100, Palo Alto, CA 94303; 415-494-1112; fax, 415-494-1113.

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GO TO TOWN: Each building in Professor Piccolo's town contains a trove of musical treasures.

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IDEAS

Give Your Mind a Whack

BY JULIE COHEN

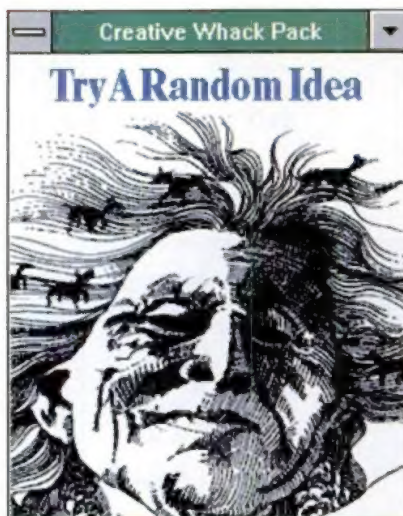
Everybody needs a whack on the head now and then. How else would problems get solved? Taking this self-help approach, Creative Whack Pack, from Creative Think, gives you new tools to generate ideas and come up with creative solutions.

Based on the book *A Whack on the Side of the Head*, by Roger von Oech, this package contains two essential elements: a beautifully illustrated deck of cards and a journal. You choose an issue or let the program suggest one—anything from “finding beauty

today” to “becoming less of a dork” to “negotiating an agreement.” Then you turn the cards and examine your possibilities.

The 64 cards come in four suits: Artist, Judge, Explorer, and Warrior. Each card contains a title (really more of a directive), a whimsical pen-and-ink illustration, a brief story, and a series of questions tied to that card's theme.

With titles like “Drop an Assumption” (an Explorer card), “Solve the Right Problem” (a Judge card), and “Ask What If” (an Artist card), the cards point you to new sources of information, force you to you examine



WHAT A GREAT IDEA! Creative Whack Pack helps you generate new solutions to a problem.

your thinking.

It's the journal, however, that makes Creative Whack Pack more effective than the book or the cards alone. An-

swer each card's questions carefully; your responses are entered in the journal, which you'll later refer back to in order to reflect on your ideas, establish patterns, and formulate your plan.

No self-help program can solve your problems for you; ultimately, you have to take action. Creative Whack Pack prods you to take the first step. □

Creative Whack Pack, \$49.95. Requires: 4MB RAM, Windows 3.0 or later, 5.4MB hard disk space. *Creative Think, P.O. Box 7354, Menlo Park, CA 94026; 415-321-6775; fax, 415-321-0609.*

Circle 482 on reader service card

SPOTLIGHT ON HARDWARE

Game Blaster Puts PC Games on the Big Screen

by Jeff Greenberg

It's ironic: Today's best PC-based games offer more realistic, higher-resolution graphics than most Sega or Nintendo games. But you have to view these superior images on a tiny 14-inch monitor. Wouldn't it be great to play your game in the living room, on that large-screen TV?

Advanced Digital Systems (ADS) comes to the rescue, letting you display your VGA output on any television. The ADS Game Blaster converts your computer's VGA signal into two United States television formats, the standard NTSC composite signal and the slightly improved S-Video format, which is available on most later-model televisions.

The Game Blaster pack-



age includes the scan converter card itself, a VGA splitter cable, a power supply, an RCA composite video cable, an S-Video cable and driver software. To help you get started in your big-screen adventures the package also includes three popular games:

Broderbund's *Prince of Persia*, and two from Velocity Development, *Jet Fighter II* and a limited edition of *Spectre Challenger*.

The Game Blaster can handle VGA signals up to 640-by-480 with 256 colors. It automatically converts the signal to the lower-resolution TV standards. To reduce

the image, however, Game Blaster throws away some of the extra pixels. As a result, on-screen objects that are only 1 pixel thick may disappear. This technique usually isn't a problem with games, but it can make other software, such as character-based applications and Microsoft

Windows, difficult to use.

Scan converters are not a new technology. In fact, the Game Blaster is manufactured by a Taiwanese firm and has been available under other private labels. What sets the Games Blaster apart is its aggressive \$169 price and the inclusion of three ready-to-play games.

If you are a secret PC game player and are ready to come out of the closet, then you might as well go right to the living room. Game Blaster can help you make the transition in a big way.

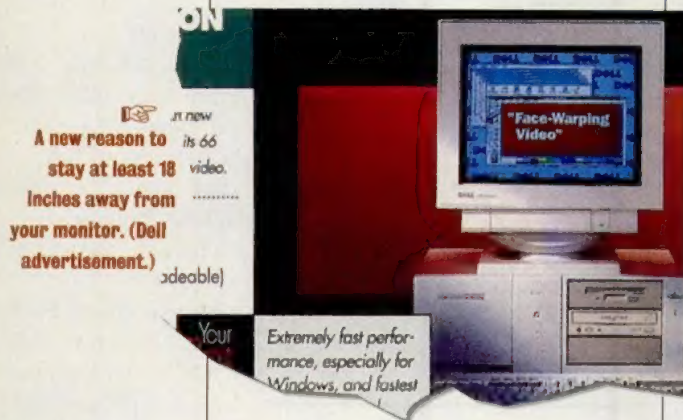
Game Blaster, \$169. *Advanced Digital Systems, 20204 State Rd., Cerritos, CA 90701; 800-888-5244, 310-865-1432; fax, 310-809-6144.*

Circle 484 on reader service card

Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott



Coming to a Theater Near You

"When 'Demolition Man' opens in theaters across the country, moviegoers will get to see a number of nVIEW's projection panels on the big screen, including the MediaPro panel that gets shot by one of the movie's stars, Sylvester Stallone. nVIEW President William M. Donaldson is not too disappointed about the MediaPro's demise."

—nVIEW CORP. PRESS RELEASE

Maybe It Needs a Random Adjective Generator, Too

Number 4 from "Top 10 Features Included in Word 6.0":

"AutoCorrect—Program corrects your most frequently typos as you type."

—WINDOWS SOURCES

Good & Plentium—But Not Plentiful

"Right now, 386 chips are two generations behind. The latest chip, which some call the 586, is officially called the Plentium... The Plentium chips are new, are in somewhat short supply, and are expensive. If you're dealing with lots of data... go for the speediest chip you can afford."

—PHYSICIAN'S MANAGEMENT

Enough with the Terrible Car Analogies, Already!

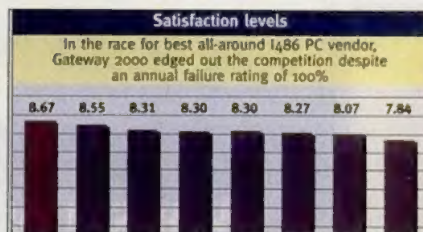
"C—A programming language developed at Bell Labs for use on UNIX systems; it is to MS DOS as a Ferrari Testarossa is to a Ford Escort."

—ANN ARBOR NEWS

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—BRANDON (FLORIDA) NEWS



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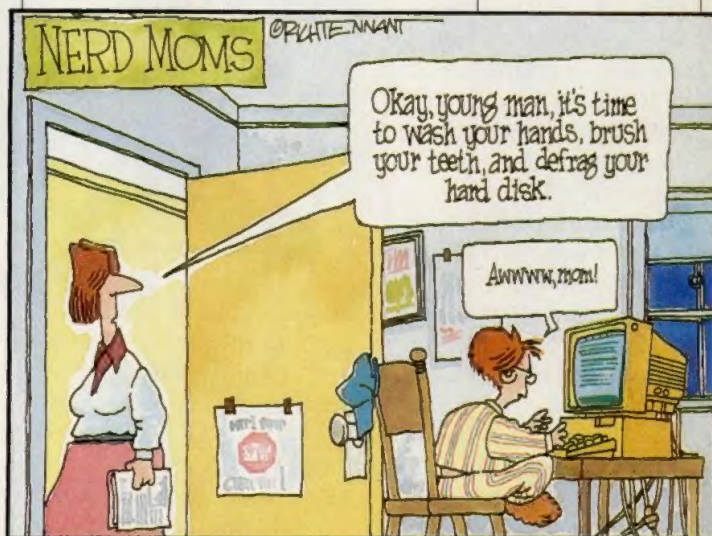
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But will it remove a stubborn virus?

This Computerworld chart legend leaves us a tad confused.



If your entry is used, we'll send you \$50 and a PC Magazine T-shirt. Send your entries to Abort, Retry, Fail?, PC Magazine, One Park Ave., New York, NY 10016-5802. Winners this issue: William B. Adams, Michael Dragutsky, Douglas Jay, Thomas P. Joseph, Scott McKell, Edward Patterson, Kenneth Webster.

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